

FINAL REPORT NUMBER 201U-MGA-05-08

SAFETY COMPLIANCE TESTING FOR FMVSS 201U
Occupant Protection In Interior Impact
Upper Interior Head Impact Protection

DAIMLERCHRYSLER CORPORATION
2005 Jeep Grand Cherokee 4-Door MPV
NHTSA No. C50307

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48063



Test Dates: April 5-7, 2005
Report Date: April 8, 2005

FINAL REPORT

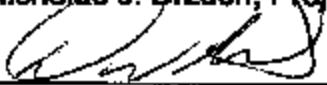
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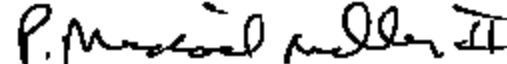
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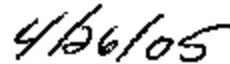

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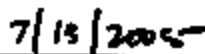

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16. Abstract A compliance test series was conducted on the subject 2005 Jeep Grand Cherokee 4-Door MPV, NHTSA No. C50307, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201U compliance. The testing was conducted at MGA Research Corporation in Troy, Michigan on April 5-7, 2005. Test failures identified were as follows: None The data recorded seems to indicate that the 2005 Jeep Grand Cherokee 4-Door MPV tested appears to comply with the requirements for FMVSS 201U which were set forth by the National Highway Traffic Safety Administration.			
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact compliance test was to determine whether the subject vehicle, a 2005 Jeep Grand Cherokee 4-Door MPV, meets the upper interior performance requirements of FMVSS 201, Occupant Protection.

Tests were conducted during April 5-7, 2005 on a 2005 Jeep Grand Cherokee 4-Door MPV, manufactured by DaimlerChrysler Corporation.

All tests were conducted in accordance with the U. S. Department of Transportation, National Highway Traffic Safety Administration's Laboratory Test Procedure TP-201U-01 dated April 3, 1998 and the corresponding MGA Research Corporation's FMVSS 201U procedure number MGATP201U_FRAME#2 dated March 20, 2003.

All tests were conducted at MGA Research Corporation in Troy, Michigan and were performed by MGA engineers and technicians. The FMVSS 201U Impactor test machine was used to conduct the testing. Target locations were determined by using a Coordinate Measurement Machine in conjunction with the MGA EZ-Target™ program and MGA procedure MGATP201U_Test Series dated March 20, 2003.

2.0 COMPLIANCE TEST DATA SUMMARY

The 2005 Jeep Grand Cherokee 4-Door MPV was equipped with A, B, C, and rear-pillars, an assist handle on each A-pillar, a grab handle located on the side rail above each rear door, an adjustable seat belt anchorage on each B-pillar, and a fixed seat belt anchorage on each C-pillar.

Upon completion of targeting the test vehicle, twelve (12) targets were chosen to be impacted based upon engineering judgment and certification test data provided by DaimlerChrysler. Targets were chosen which appeared most likely to give high HIC(d) values. The twelve (12) targets chosen were:

AP1	BP1	FH1	UR1
AP2	BP2	FH2	UR2
AP3	BP3	SR3-3	UR6

The 2005 Jeep Grand Cherokee 4-Door MPV tested appears to comply with the performance criteria for FMVSS 201U. The HIC(d) measured using the Part 572L (Free Motion Headform) was below 1000 for each tested component.

TABLE 2-1
SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2005 Jeep Grand Cherokee 4-Door MPV

VEH. NHTSA NO.: C50307 VIN: 1J4GR48K35C539018 COLOR: Blue

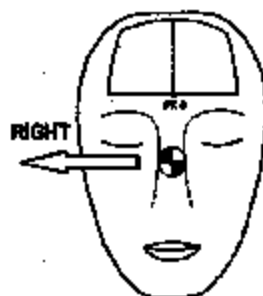
VEH. BUILD DATE: November, 2004 TEST DATES: April 5-7, 2005

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood, Matt Kerr

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (lph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Right	159	47	23.8	560	522	27	0
AP2	Left	201	47	23.7	497	438	31	0
AP3	Right	159	47	23.8	614	583	14	7 Left
BP1	Right	90	17	24.4	458	386	44	3 Left
BP2	Right	90	2	24.4	722	737	20	3 Right
BP3	Left	278	-8	24.1	584	566	33	10 Left
FH1	Right	180	50	24.0	486	423	43	37 Right
FH2	Left	180	50	23.4	420	337	26	3 Left
SR3-3	Left	270	50	23.5	749	773	10	4 Left
UR1	Left	270	50	23.4	492	431	35	12 Right
UR2	Left	270	48	23.3	474	408	30	5 Left
UR6	Right	90	41	23.7	422	338	46	0

Above and left/right refers to the position relative to reference pt. 0 where the target made contact with the Free Motion Headform. See the diagram below for details.



POST TEST COMMENTS:

The following description lists any post-test damage or other test observations for each target.

AP1 Right: Headliner displacement.

AP2 Left: Windshield cracked.

AP3 Right: Screw cover popped off.

FH2 Left: Windshield cracked.

UR1 Left: Headliner deformation.

REMARKS:

The targets listed were impacted in the following order:

Right: AP3, AP1, BP2, BP1, UR6, FH1

Left: AP2, UR1, BP3, UR2, SR3-3, FH2

The 150 mm rule was observed for targets horizontal to each other and the 200 mm rule was observed for vertical components.

RECORDED BY: Nicholas J. Brzuch

DATE: April 7, 2005

APPROVED BY: David G. Gotwals

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2005 Jeep Grand Cherokee 4-Door MPVVEH. NHTSA NO.: C50307 VIN: 1J4GR48K35C539018 COLOR: BlueVEH. BUILD DATE: November, 2004 TEST DATES: April 5-7, 2005TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood, Matt Kerr

INTERIOR TRIM INFORMATION: A, B, C, and rear-pillars, an assist handle on each A-pillar, a grab handle located on the side rail above each rear door, an adjustable seat belt anchorage on each B-pillar, and a fixed seat belt anchorage on each C-pillar.

SUNROOF INFORMATION:

Installed: Yes X No
Operation: Electric Manual

ROLL-BAR INFORMATION:

Installed: Yes X No
Padded: Yes X No
Braces: Yes X No

GENERAL INFORMATION:

Date Received: March 17, 2005; Odometer Reading 18 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: DaimlerChrysler CorporationDate of Manufacture: November, 2004; VIN: 1J4GR48K35C539018GVWR: 2677 kg; GAWR FRONT: 1339 kg;GAWR REAR: 1452 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 228 kpa REAR: 228 kpaRecommended Tire Size: P235/65R17

Recommended Cold Tire Pressure:

FRONT: 228 kpa REAR: 228 kpaSize of Tire on Test Vehicle: P235/65R17Type of Spare Tire: P235/65R17 Saver: ; Standard X

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench ; Bucket X; Split Bench Number of Occupants: Front 2; Rear 3; TOTAL 5VEHICLE CAPACITY WEIGHT (VCW) = 498 kgNo. of Occupants x 68 kg = 340 kgRated Cargo/Luggage Weight (RCLW) = 158 kg (difference) 348 (lbs.)Max. Test Cargo/Luggage Weight (RCLW) = 136 kg (300 lbs.)

WEIGHT OF TEST VEHICLE AS DELIVERED AT LABORATORY: (with maximum fluids)

Right Front = 516.0 kg Right Rear = 467.0 kgLeft Front = 566.0 kg Left Rear = 487.0 kgTOTAL FRONT = 1082.0 kg TOTAL REAR = 954.0 kg% Total Weight = 53.1 % % Total Weight = 46.9 %TOTAL DELIVERED WEIGHT = 2036.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 2036 kgRated Cargo/Luggage Weight = 136 kgTarget Test Weight = 2172 kg

WEIGHT OF TEST VEHICLE FULLY LOADED:

Right Front =	<u>515.0</u> kg	Right Rear =	<u>537.0</u> kg
Left Front =	<u>561.5</u> kg	Left Rear =	<u>557.5</u> kg
TOTAL FRONT =	<u>1076.5</u> kg	TOTAL REAR =	<u>1094.5</u> kg
% Total Weight =	<u>49.6</u> %	% Total Weight =	<u>50.4</u> %
TOTAL TEST WEIGHT = <u>2171.0</u> kg			
Weight of ballast secured in vehicle's cargo area = <u>135</u> kg			

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 837 mm; Left Front 830 mm;
 Right Rear 855 mm; Left Rear 847 mm;
 Pitch Angle at Right Door Sill = -0.3 Rear higher
 Pitch Angle at Left Door Sill = 0.7 Rear higher
 Roll Angle at Front Bumper = 0.1 Left higher
 Roll Angle at Rear Bumper = -0.2 Left higher

FULLY LOADED: Right Front 837 mm; Left Front 819 mm;
 Right Rear 827 mm; Left Rear 831 mm;
 Pitch Angle at Right Door Sill = 0.3 Front higher
 Pitch Angle at Left Door Sill = 0.3 Rear higher
 Roll Angle at Front Bumper = 0.2 Left higher
 Roll Angle at Rear Bumper = -0.2 Left higher

AS TARGETED: Right Front 996 mm; Left Front 993 mm;
 Right Rear 987 mm; Left Rear 984 mm;
 Pitch Angle at Right Door Sill = 0.0
 Pitch Angle at Left Door Sill = 0.3 Rear higher
 Roll Angle at Front Bumper = 0.1 Left higher
 Roll Angle at Rear Bumper = -0.2 Left higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill = -0.1 Rear higher
 Pitch Angle at Left Door Sill = 0.5 Rear higher
 Roll Angle at Front Bumper = 0.2 Left higher
 Roll Angle at Rear Bumper = -0.2 Left higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill = -0.1 Rear higherPitch Angle at Left Door Sill = 0.5 Rear higherRoll Angle at Front Bumper = 0.2 Left higherRoll Angle at Rear Bumper = -0.2 Left higherVEHICLE WHEELBASE = 2735 mm

REMARKS: The seat travel distance was measured to be 268 mm for the driver front seat and 268 mm for the passenger front seat.

RECORDED BY: Nicholas J. BrzuchDATE: March 29, 2005APPROVED BY: David G. Gotwals

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 2005 Jeep Grand Cherokee 4-Door MPVVEH. NHTSA NO.: C50307 VIN: 1J4GR48K35C539018 COLOR: BlueVEH. BUILD DATE: November, 2004 TEST DATES: April 5-7, 2005TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood, Matt Kerr

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

	HORIZONTAL ANGLE SPECIFIED RANGE	MINIMUM HORIZONTAL ANGLE	MAXIMUM HORIZONTAL ANGLE
A-PILLAR	L 195°-255°	L 200.3°	L 254.0°
	R 105°-165°	R 106.0°	R 159.8°
B-PILLAR	L 195°-345°	L 199.5°	L 278.0°
	R 15°-165°	R 80.4°	R 160.4°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: Nicholas J. BrzuchDATE: March 29, 2005APPROVED BY: David G. Gotwals

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2005 Jeep Grand Cherokee 4-Door MPVVEH. NHTSA NO.: C50307 VIN: 1J4GR48K35C539018 COLOR: BlueVEH. BUILD DATE: November, 2004 TEST DATES: April 5-7, 2005TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwale, Nicholas Brzuch, Bryan Hood, Matt Kerr

VERTICAL IMPACT ANGLE RANGES

		VERTICAL ANGLE SPECIFIED RANGE		MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
FRONT HEADER	FH1	L	0°-50°	L 0°	L 50°
		R	0°-50°	R 0°	R 50°
	FH2	L	0°-50°	L 0°	L 50°
		R	0°-50°	R 0°	R 50°
SIDE RAIL	SR1	L	0°-50°	L 0°	L 27°
		R	0°-50°	R 0°	R 15°
	SR2A	L	0°-50°	L 0°	L 28°
		R	0°-50°	R 0°	R 26°
	SR2B	L	0°-50°	L 0°	L 30°
		R	0°-50°	R 0°	R 27°
	SR3-1	L	0°-50°	L 0°	L 50°
		R	0°-50°	R 0°	R 50°
	SR3-2	L	0°-50°	L 0°	L 50°
		R	0°-50°	R 0°	R 50°
	SR3-3	L	0°-50°	L 0°	L 50°
		R	0°-50°	R 0°	R 50°
A-PILLAR	AP1	L	-5°-50°	L -5°	L 47°
		R	-5°-50°	R -5°	R 47°
	AP2	L	-5°-50°	L -5°	L 47°
		R	-5°-50°	R -5°	R 48°

		VERTICAL ANGLE SPECIFIED RANGE		MINIMUM VERTICAL ANGLE		MAXIMUM VERTICAL ANGLE		
B-PILLAR	AP3	L	-5°-50°	L	-5°	L	47°	
		R	-5°-50°	R	-5°	R	47°	
	BP1	L	-10°-50°	L	-10°	L	15°	
		R	-10°-50°	R	-10°	R	17°	
		BP2*	L	0°-50°	L	0°	L	3°
			R	0°-50°	R	0°	R	2°
		BP3	L	-10°-50°	L	-10°	L	-8°
			R	-10°-50°	R	-10°	R	-6°
		BP4	L	-10°-50°	L	-10°	L	-8°
			R	-10°-50°	R	-10°	R	-9°
OTHER PILLAR	OP1**	L	-10°-50°	L	-10°	L	-5°	
		R	-10°-50°	R	-10°	R	-3°	
	OP2	L	-10°-50°	L	-10°	L	-5°	
		R	-10°-50°	R	-10°	R	-3°	
UPPER ROOF 1		0°-50°		0°		50°		
UPPER ROOF 2		0°-50°		0°		48°		
UPPER ROOF 3		0°-50°		0°		30°		
UPPER ROOF 4		0°-50°		0°		36°		
UPPER ROOF 5		0°-50°		0°		26°		
UPPER ROOF 6		0°-50°		0°		41°		

As determined using the Procedures specified in S8.13.4.2. *Target BP2 is a seat belt anchorage location. **Target OP1 is a seat belt anchorage location that is flush with the O-Pillar trim.

RECORDED BY: Nicholas J. Brzuch

DATE: March 29, 2005

APPROVED BY: David G. Gotwals

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2005 Jeep Grand Cherokee 4-Door MPVVEH. NHTSA NO.: C50307 VIN: 1J4GR48K35C539018 COLOR: BlueVEH. BUILD DATE: November, 2004 TEST DATES: April 5-7, 2005TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood, Matt Kerr

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	268 mm	268 mm
T°	Horizontal < (CG-F1 (Left Seat) to (Right A-Pillar))	106.0°	--
A1°	360° - T°	254.0°	--
W°	Horizontal < (CG-2 (Left Seat) to (Left A-Pillar))	200.3°	--
A2°	A2° = W°	200.3°	--
U°	Horizontal < (CG-2 (Left Seat) to (Left B-Pillar))	278.0°	--
B1°	B1° = U°	278.0°	--
V°	Horizontal < (CG-R (Left Seat) to (Left B-Pillar))	199.5°	--
B2°	B2° = V°	199.5°	--
W° (right)	Horizontal < (CG-F2 (Right Seat) to (Right A-Pillar))	--	159.8°
A1° (right)	A1° (right) = W° (right)	--	159.8°
T° (right)	Horizontal < (CG-F1 (Right Seat) to (Left A-Pillar))	--	254.0°
A2° (right)	360° - T° (right)	--	106.0°
V° (right)	Horizontal < (CG-R (Right Seat) to (Right B-Pillar))	--	160.4°
B1° (right)	B1° (right) = V° (right)	--	160.4°
U° (right)	Horizontal < (CG-F2 (Right Seat) to (Right B-Pillar))	--	80.4°
B2° (right)	B2° (right) = U° (right)	--	80.4°
J	A-Pillar ((Plane 3) - (Plane 6))	324.3 mm	320.4 mm
J/2	J ÷ 2	162.2 mm	160.2 mm
D1	Upper Roof ((Plane A) - (Plane B))	2245.0 mm	
D1/2	D1 ÷ 2	1122.5 mm	
D2	Upper Roof ((Plane C) - (Plane D))	1347.9 mm	
D2/2	D2 ÷ 2	674.0 mm	
.35D1	.35 x D1	785.8 mm	
.35D2	.35 x D2	471.8 mm	

Measurement	Description	Left Side	Right Side
N	B-Pillar ((BPR) - (lowest point on daylight opening forward of B-Pillar))	439.9 mm	441.1 mm
N/2	B-Pillar ((BP3) - (lowest point on daylight opening forward of B-Pillar))	220.0 mm	220.6 mm
N/4	B-Pillar ((BP4) - (lowest point on daylight opening forward of B-Pillar))	110.0 mm	110.3 mm
Q	O-Pillar (Plane 13 – Plane 14)	411.3 mm	405.0 mm
Q/2	Q / 2	205.7 mm	202.5 mm
D	R-Pillar (Point 7 – Point M)	922.0 mm	944.0 mm
3D/7	3*D / 7	395.1 mm	404.6 mm

As determined using the Procedures specified in S10.1-10.13.

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	3037.5	-409.4	1377.1	3037.2	408.8	1377.4
Rear Row	3875.3	-409.7	1414.1	3875.0	408.6	1414.4

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	2929.5	-409.4	2037.1	2929.2	408.8	2037.4
CGF2	3197.5	-409.4	2037.1	3197.2	408.8	2037.4
CGR	4035.3	-409.7	2074.1	4035.0	408.6	2074.4

REFERENCE FOR WORLD COORDINATE SYSTEM (measured in millimeters):

Front outboard driver-side seat bolt anchorage (x, y, z) = 2681.4, -627.4, 1097.6

REMARKS: This vehicle was targeted in a world coordinate system only, as a vehicle coordinate system reference was not provided. The seating reference points (SgRP's) were determined using the above reference coordinate that was provided.

RECORDED BY: Nicholas J. Brzuch

DATE: March 29, 2005

APPROVED BY: David G. Gotwale

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2005 Jeep Grand Cherokee 4-Door MPVVEH. NHTSA NO.: C50307 VIN: 1J4GR48K35C539018 COLOR: BlueVEH. BUILD DATE: November, 2004 TEST DATES: April 5-7, 2005TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood, Matt Kerr

SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
A-Pillar Left Side								
AP1	2775.0	-634.3	2134.9	--	--	Yes	--	--
REL	2781.4	-589.8	2108.9	201	47	--	2	No
AP2	2663.5	-608.1	2046.4	201	47	No	--	Yes
AP3	2530.8	-640.6	1972.3	201	47	No	--	No
A-Pillar Right Side								
AP1	2775.5	632.4	2137.2	--	--	Yes	--	--
REL	2782.3	587.2	2109.5	159	47	--	2	Yes
AP2	2667.1	610.6	2050.1	159	48	No	--	No
AP3	2536.8	645.9	1976.8	159	47	No	--	Yes
B-Pillar Left Side								
BP1	3284.6	-648.3	2213.2	270	15	No	--	No
BP2	3270.5	-650.5	1981.4	270	3	No	--	No
BP3	3229.1	-676.0	1994.0	278	-8	No	--	Yes
BP4	3315.6	-704.1	1884.6	225	-8	No	--	No
B-Pillar Right Side								
BP1	3286.2	544.4	2217.4	90	17	No	--	Yes
BP2	3272.2	649.2	1987.7	90	2	No	--	Yes
BP3	3228.3	673.9	1997.6	81	-6	No	--	No
BP4	3318.8	703.8	1887.9	128	-9	No	--	No
Other Pillar Left Side								
OPR	4070.3	-544.4	2232.3	--	--	--	--	--
OP1	4118.1	-660.1	2043.0	270	-5	No	--	No

SUMMARY OF TARGETING RESULTS

Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
OP2	4135.0	-664.5	2026.0	270	-5	No	—	No
Other Pillar Right Side								
OPR	4073.9	539.1	2236.2	--	--	--	--	--
OP1	4120.2	656.0	2041.5	90	-3	No	--	No
OP2	4140.9	661.5	2031.9	90	-3	No	--	No
Rear Pillar Left Side								
RP1	4616.2	-562.3	2174.0	Target exempt from testing per S6.3(b).				No
RP2	4752.2	-639.2	2024.9	Target exempt from testing per S6.3(b).				No
Rear Pillar Right Side								
RP1	4621.9	562.7	2171.8	Target exempt from testing per S6.3(b).				No
RP2	4759.1	641.0	2022.3	Target exempt from testing per S6.3(b).				No
Front Header Left Side								
FH1	2699.1	-563.7	2145.7	--	--	Yes	--	--
REL	2673.9	-545.2	2144.9	180	50	--	1	No
FH2	2672.3	-408.9	2171.0	180	50	No	--	Yes
Front Header Right Side								
FH1	2703.1	547.1	2152.0	--	--	Yes	--	--
REL	2674.2	543.8	2146.3	180	50	--	1	Yes
FH2	2672.7	402.2	2172.5	180	50	No	--	No
Side Rail Left Side								
SR1	2925.3	-531.1	2195.0	270	27	No	--	No
SR2A	3074.4	-533.1	2214.9	270	26	No	--	No
SR2B	2984.3	-532.6	2205.9	270	30	No	--	No
SR3-1	3564.7	-563.9	2195.3	270	50	No	--	No
SR3-2	3701.8	-563.2	2198.9	270	50	No	--	No
SR3-3	4220.8	-575.7	2200.6	270	50	No	--	Yes
Side Rail Right Side								
SR1	2925.5	533.6	2194.0	90	15	No	--	No
SR2A	3075.9	530.0	2219.4	90	26	No	--	No
SR2B	2985.8	528.1	2211.9	90	27	No	--	No
SR3-1	3556.0	563.9	2198.6	90	50	No	--	No
SR3-2	3703.0	561.8	2201.9	90	50	No	--	No

SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
SR3-3	4223.5	570.6	2202.8	90	50	No	--	No
Rear Header Left Side								
RH	4574.3	-408.8	2222.9	Target exempt from testing per S6.3(b).				No
Rear Header Right Side								
RH	4580.3	409.3	2227.0	Target exempt from testing per S6.3(b).				No
Upper Roof Left Side								
UR1	2802.2	-451.8	2202.6	270	50	No	--	Yes
UR2	3284.7	-466.2	2239.8	270	48	No	--	Yes
UR3	4459.0	-484.7	2273.7	315	30	No	--	No
Upper Roof Right Side								
UR4	3077.3	484.6	2256.6	90	38	No	--	No
UR5	3555.6	486.0	2282.3	90	26	No	--	No
UR6	4074.1	486.5	2267.9	90	41	No	--	Yes

As determined using the Procedures specified in S10.1-10.13.

REMARKS: Targets RP1, RP2, and RH on each side were found to be greater than 600 mm rearward of the rearmost SgRP and therefore exempt from testing per S6.3(b).

RECORDED BY: Nicholas J. Brzuch

DATE: March 29, 2005

APPROVED BY: David G. Gotwals

A-50

2006-11-15

11:53:10

TEST #2

HV IMPACT

FN5152

4/5/06

IMPACT TEST
C0517-0118

2005 NHTSA JEEP GRAND CHEROKEE
FMVSS 2010 - UPPER INTERIOR

TEST #2 C50307 RIGHT AP1
HV IMPACT ANGLE = 159 / 47

FM5152 POST-TEST



MICHIGAN OPERATIONS
 DATE: 2/2/01
 SUPERCHDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL: 2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP1 Right
 MGA Test Reference No.: FM5152
 Approach Horizontal Angles: 150°
 Approach Vertical Angles: 47°
 Additional Description:

Test Number: #2
 Temperature: 22C
 Humidity: 30%
 Time of Test: 2:15 PM
 FMH Serial No: 037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
560	522	11.6	23.8	27	0

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-88.4	1.30	1.30
Y	6	J35841	92.6	1.54	1.54
Z	7	J35791	88.8	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Headliner displacement

Recorded By: [Signature] Approved By: [Signature] Date: 4/5/05

*Only necessary for NHTSA (Government) Compliance testing.

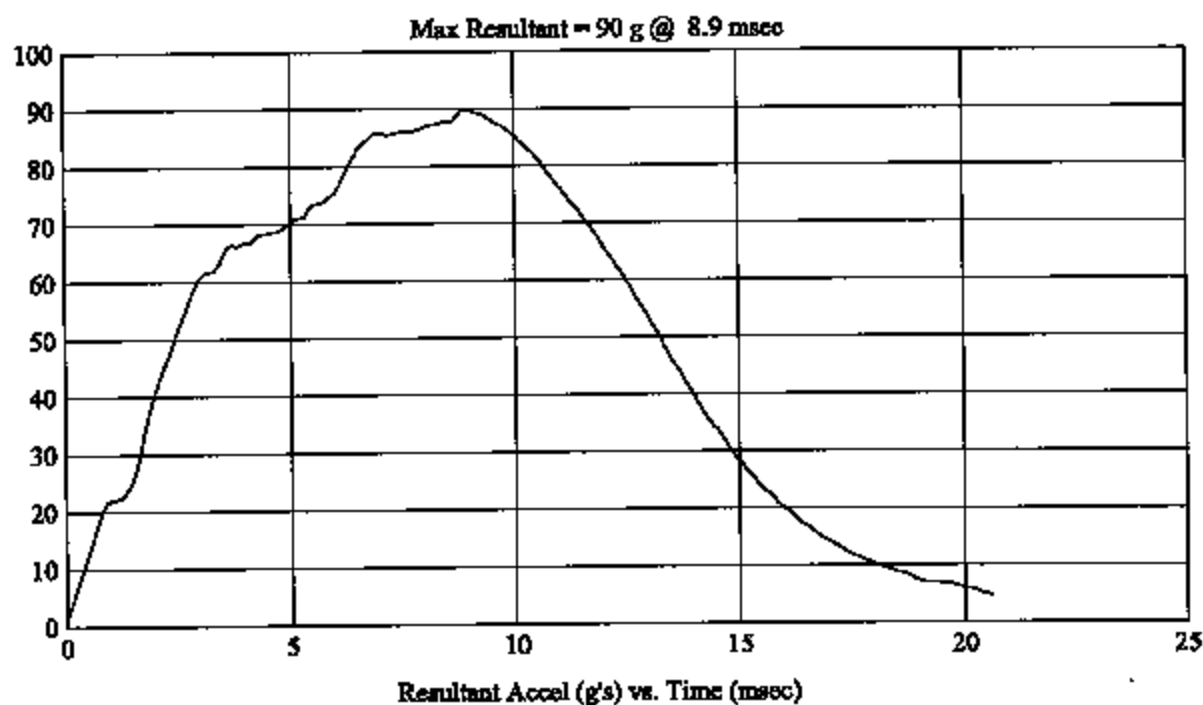
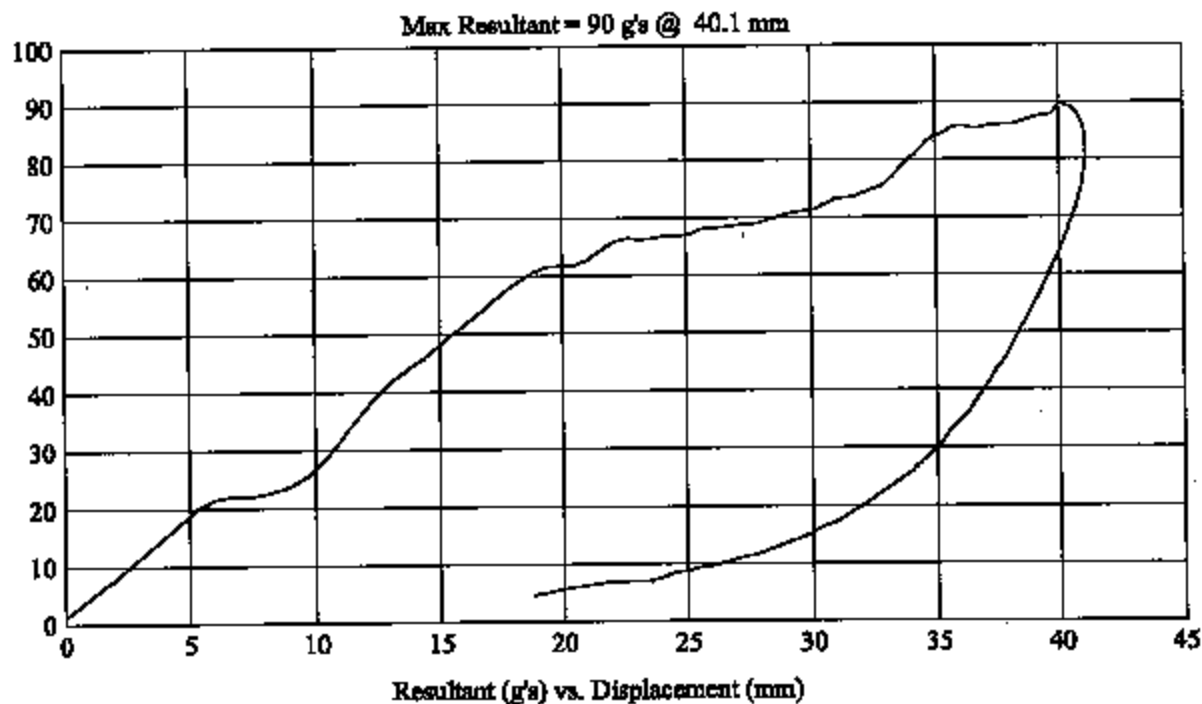
FMH
G0517-001.8Customer: NHTSA
Test # 2
FM5152
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: API
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(d) = 560, HIC = 522, Delta T = 11.6 msec



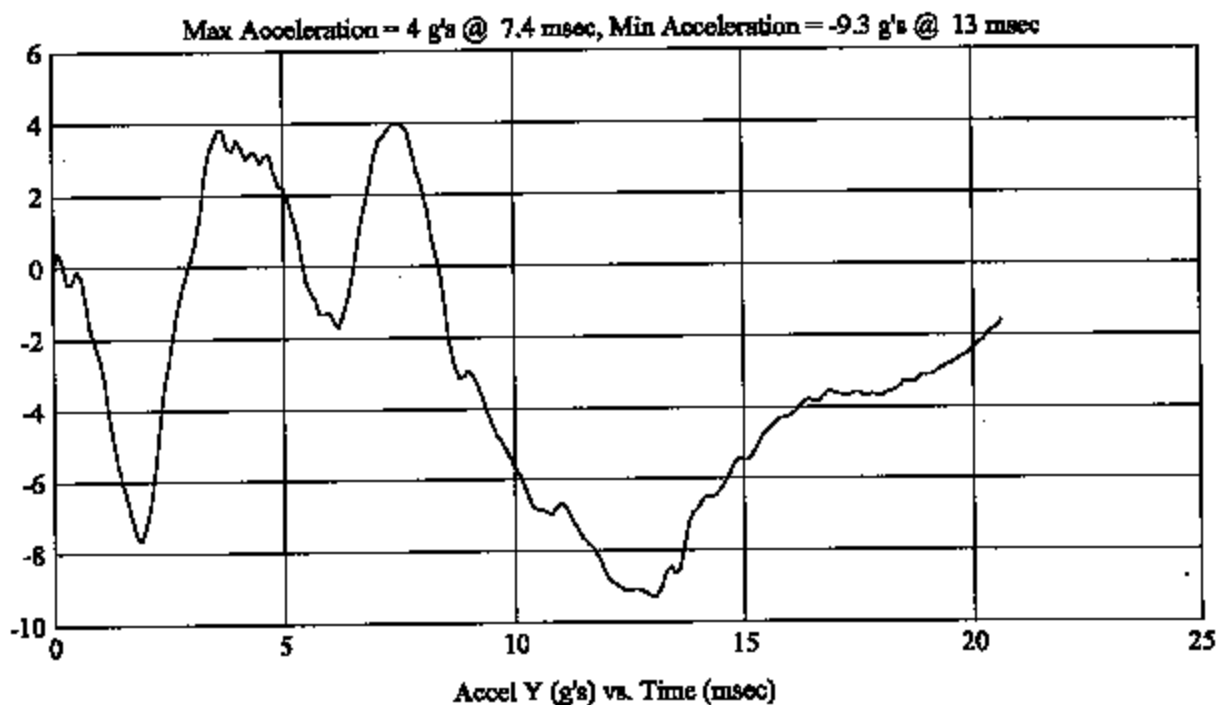
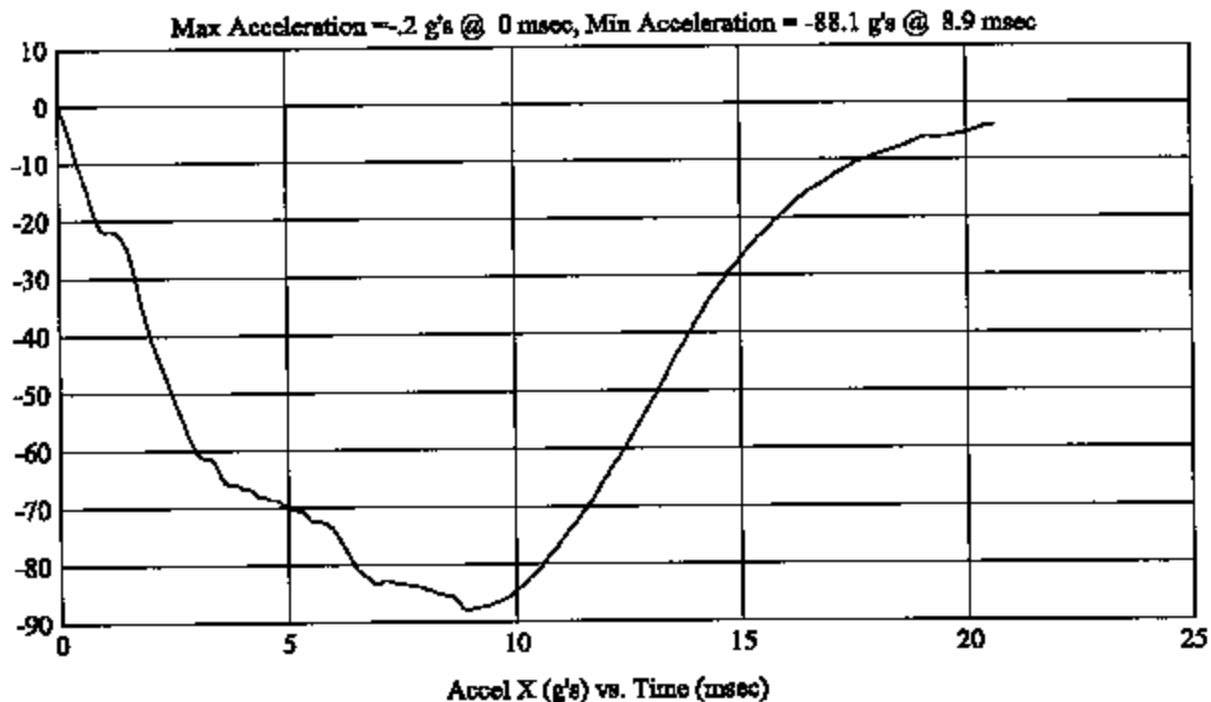
FMH
G0517-001.8Customer: NHTSA
Test # 2
FM5152
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(d) = 560, HIC = 522, Delta T = 11.6 msec



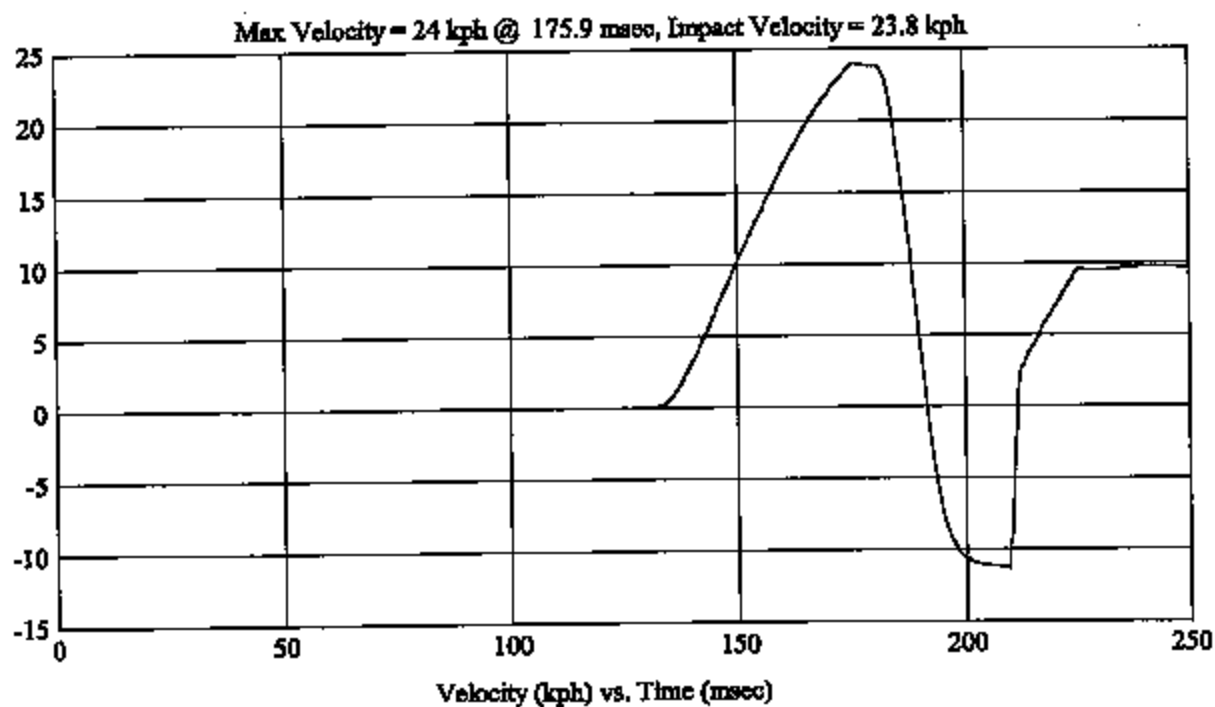
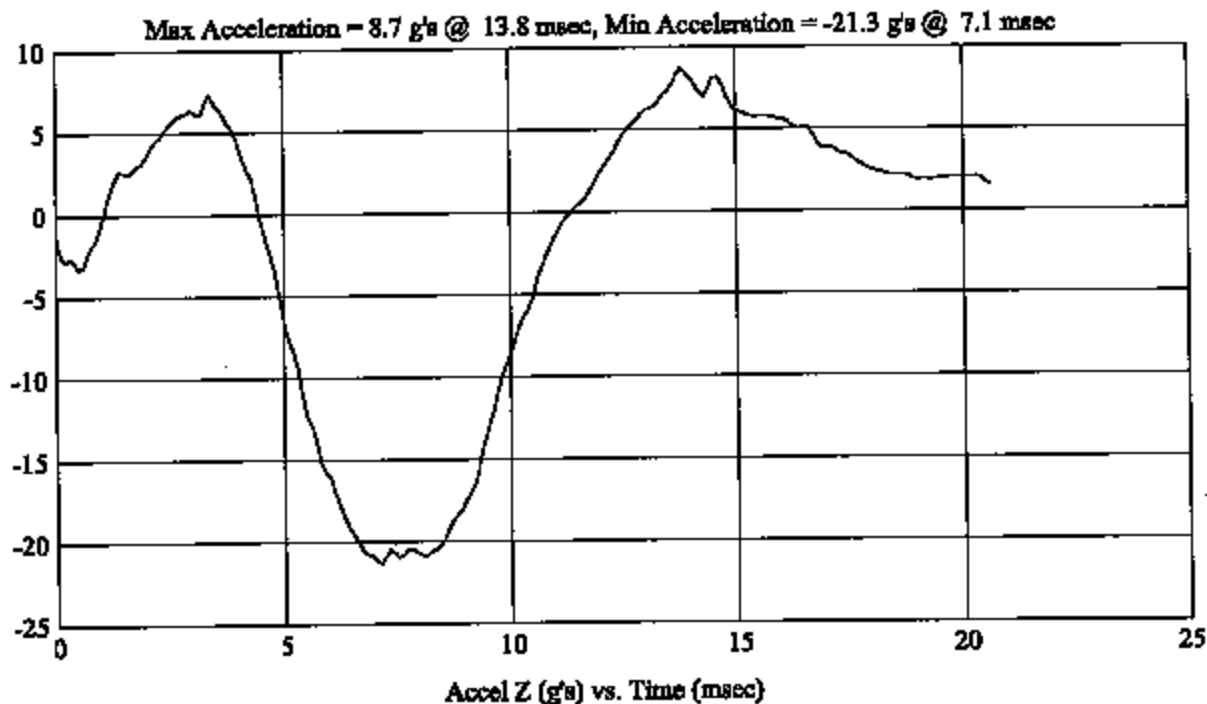
FMH
G05I7-001.8Customer: NHTSA
Test # 2
FM5152
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(d) = 560, HIC = 522, Delta T = 11.6 msec



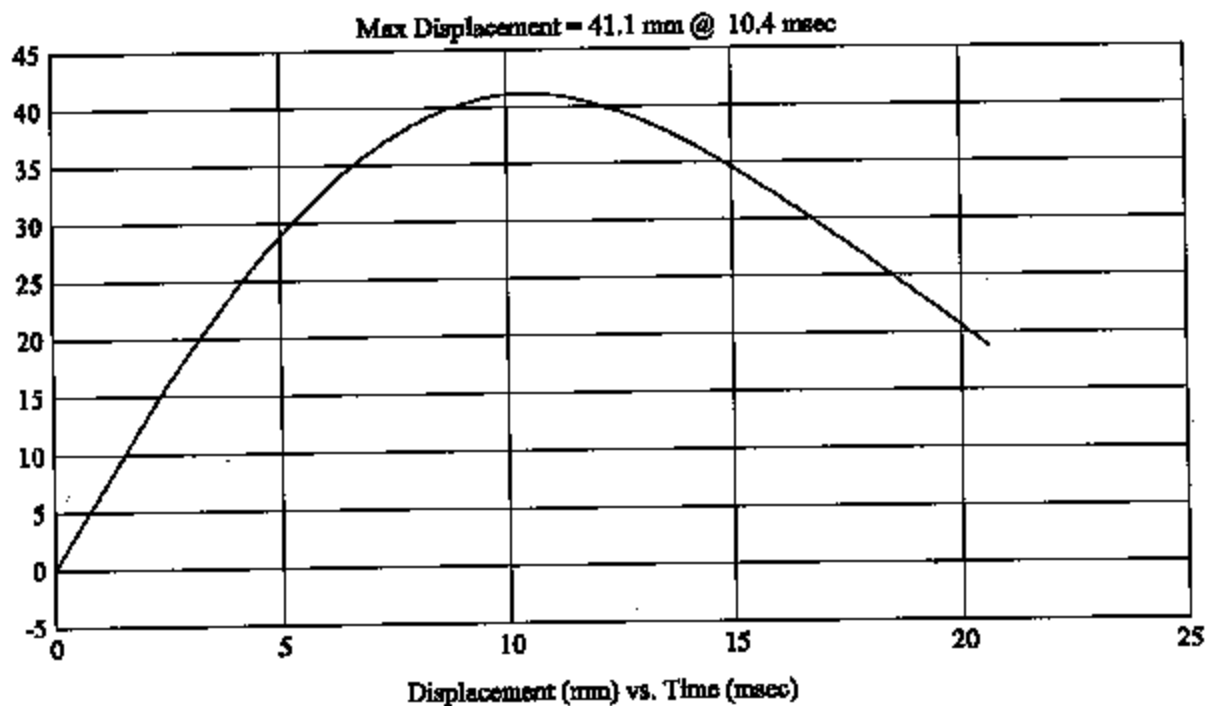
FME
G0517-001.8Customer: NHTSA
Test # 2
FM5152
Additional Desc: N/A

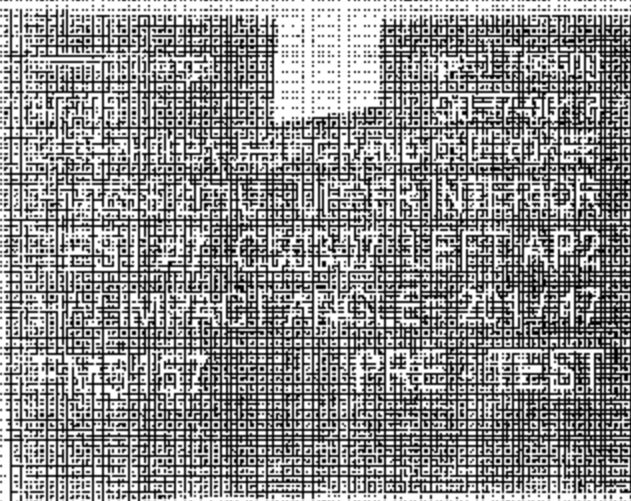
Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

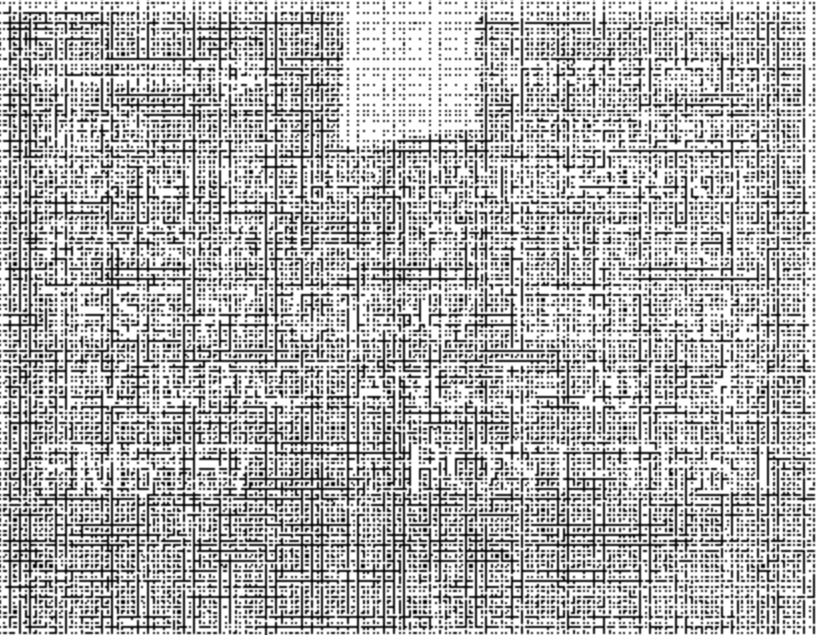
Model Year: 2005
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(d) = 560, HIC = 522, Delta T = 11.6 msec









MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
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SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL: 2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP2 Left

MGA Test Reference No.: FM5157

Approach Horizontal Angles: 201°

Approach Vertical Angles: 47°

Additional Description:

Test Number: #7

Temperature: 22°C

Humidity: 44%

Time of Test: 2:00 PM

FMH Serial No: 035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
497	438	11	23.7	31	0

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axe	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-94.1	1.44	1.44
Y	6	J35919	94.3	1.54	1.54
Z	7	J22684	92.7	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Broke windshield

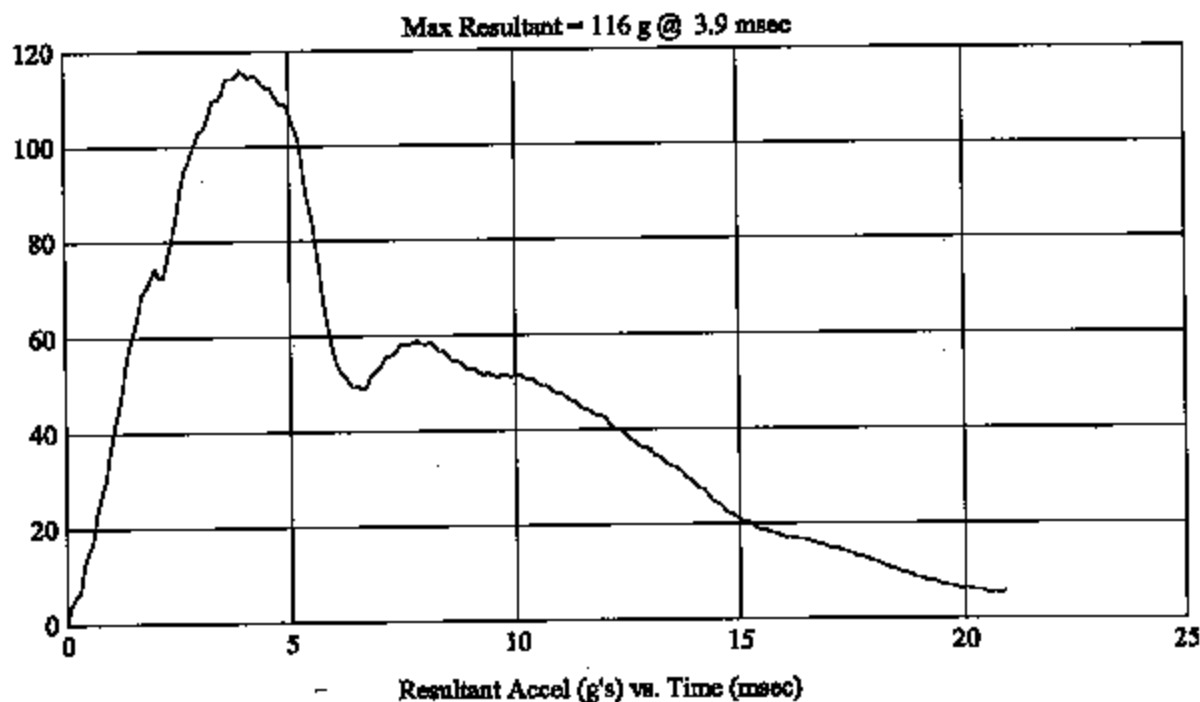
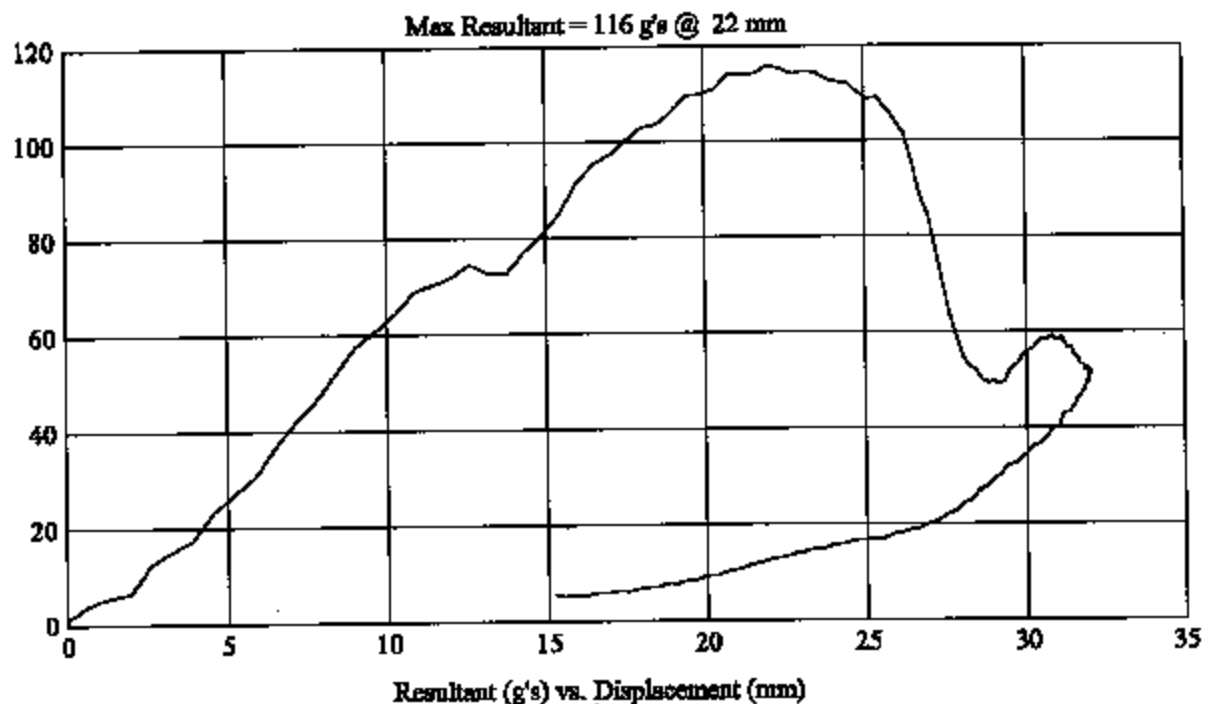
Recorded By: [Signature] Approved By: _____ Date: 4/6/05

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G0517-001.8Customer: NHTSA
Test # 7
FM5157
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/47 $HIC(d) = 497$, $HIC = 438$, $\Delta T = 11 \text{ msec}$ 

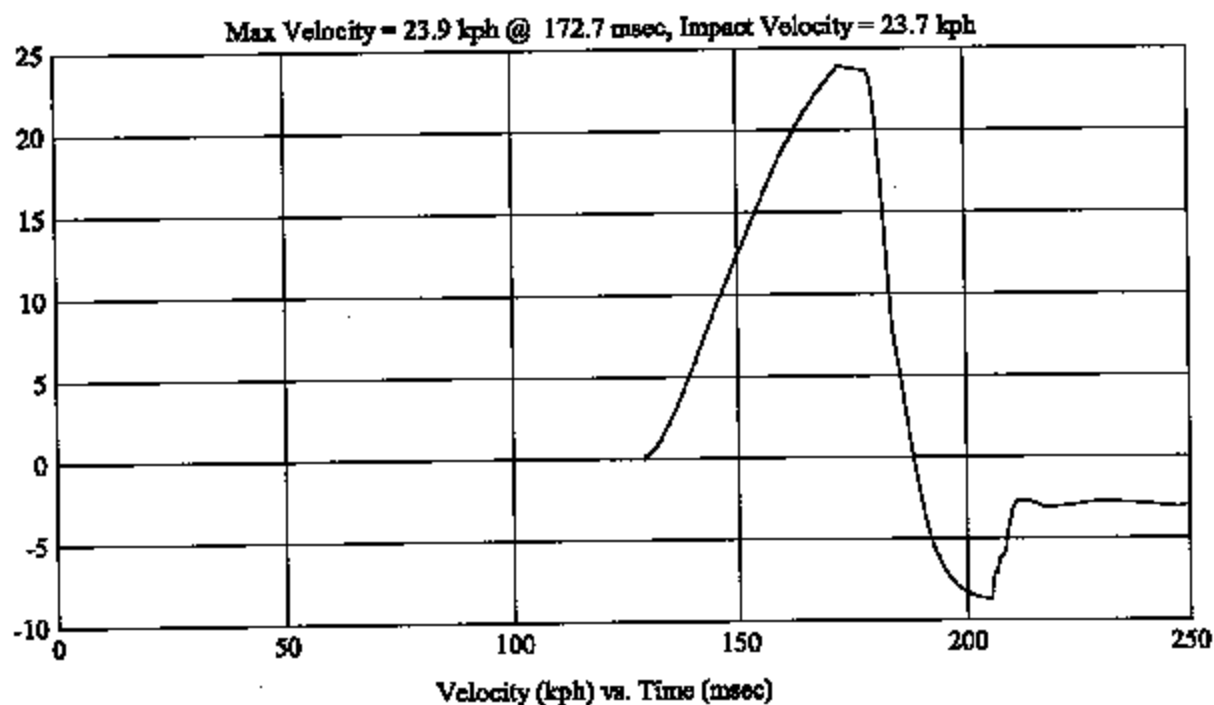
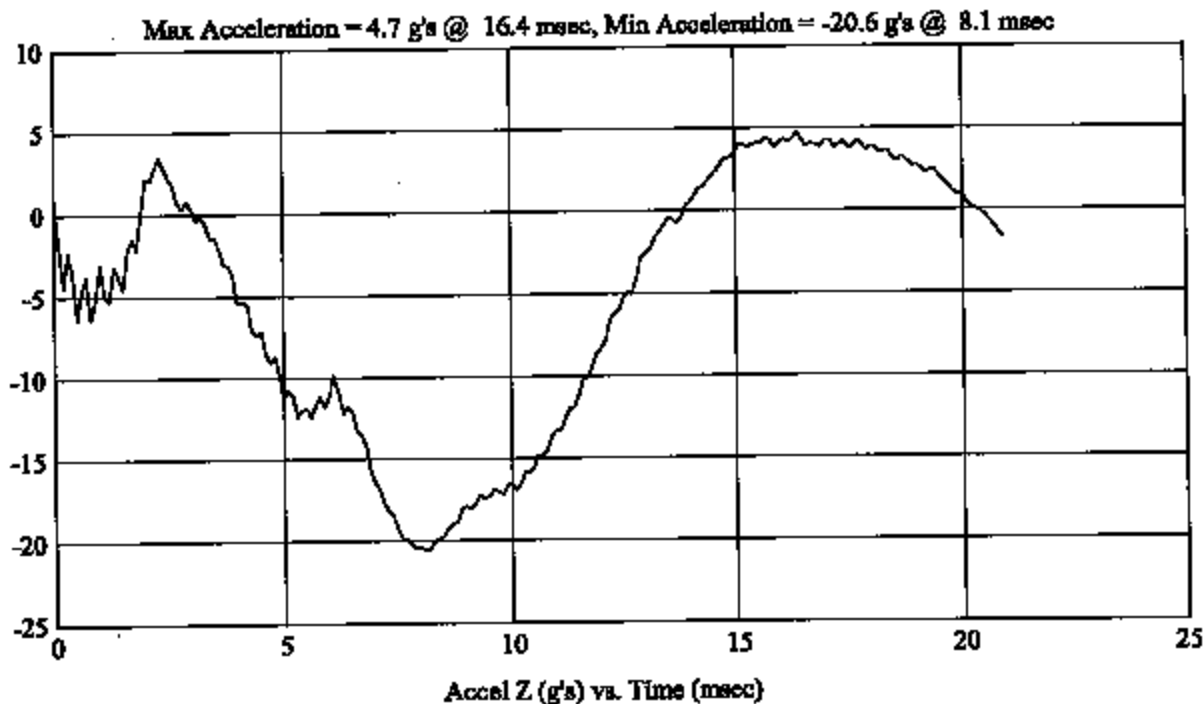
FMH
G0517-001.8Customer: NHTSA
Test # 7
FM5157
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target AP2
Vehicle Side: Left
Horz/Vert Angle: 201/47

HIC(d) = 497, HIC = 438, Delta T = 11 msec



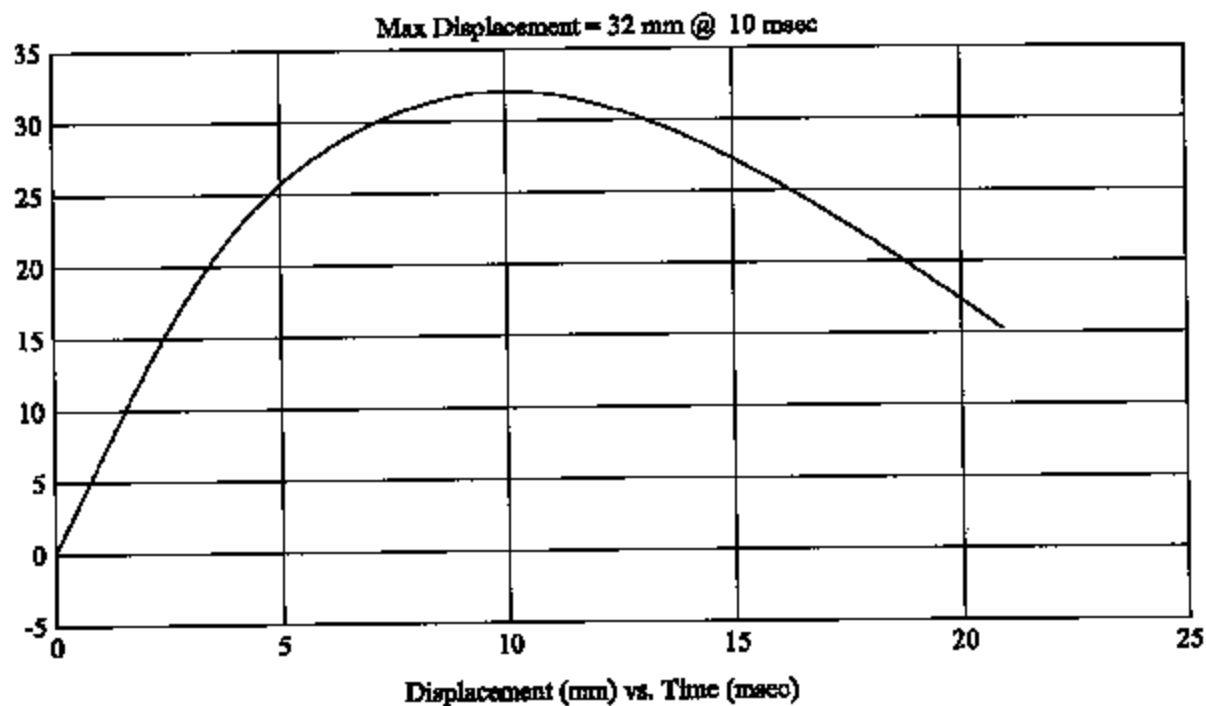
FMH
G05I7-001.8Customer: NETSA
Test # 7
FM5157
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: AP2
Vehicle Side: Left
Hertz/Vert Angle: 201/47

HIC(d) = 497, HIC = 438, Delta T = 11 msec





INSTRUMENT

4/2/83

2007-175A REF GRAND CENTRAL

FMVSS 201U - UPPER INTERIOR

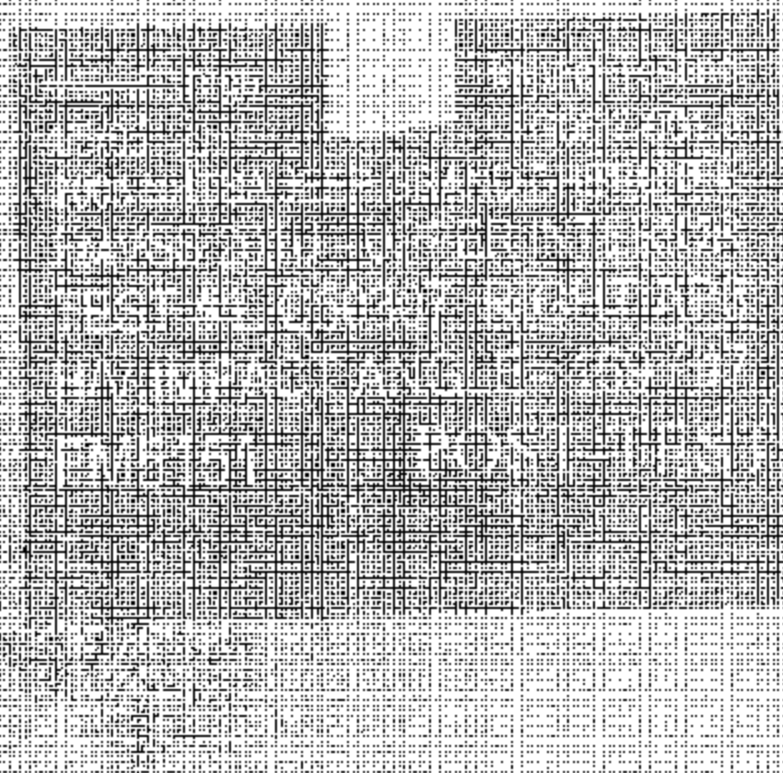
TEST # CS0307 RIGHT AP3

HV IMPACT ANGLE= 150+47

FM5161 POST-TEST

INSTRUMENT

0657-0613



MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERSEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
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SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP3 Right

MGA Test Reference No.:FM5151

Approach Horizontal Angles:150°

Approach Vertical Angles:47°

Additional Description:

Test Number:#1

Temperature:22C

Humidity:30%

Time of Test: 1:40 PM

FMH Serial No:035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
614	593	10.8	23.8	14	7 L

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-94.1	1.29	1.29
Y	6	J35919	94.3	1.54	1.54
Z	7	J22664	92.7	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Screw cover came off

Recorded By: *[Signature]*

Approved By*: *[Signature]*

Date: 4/5/05

*Only necessary for NHTSA (Government) Compliance testing.

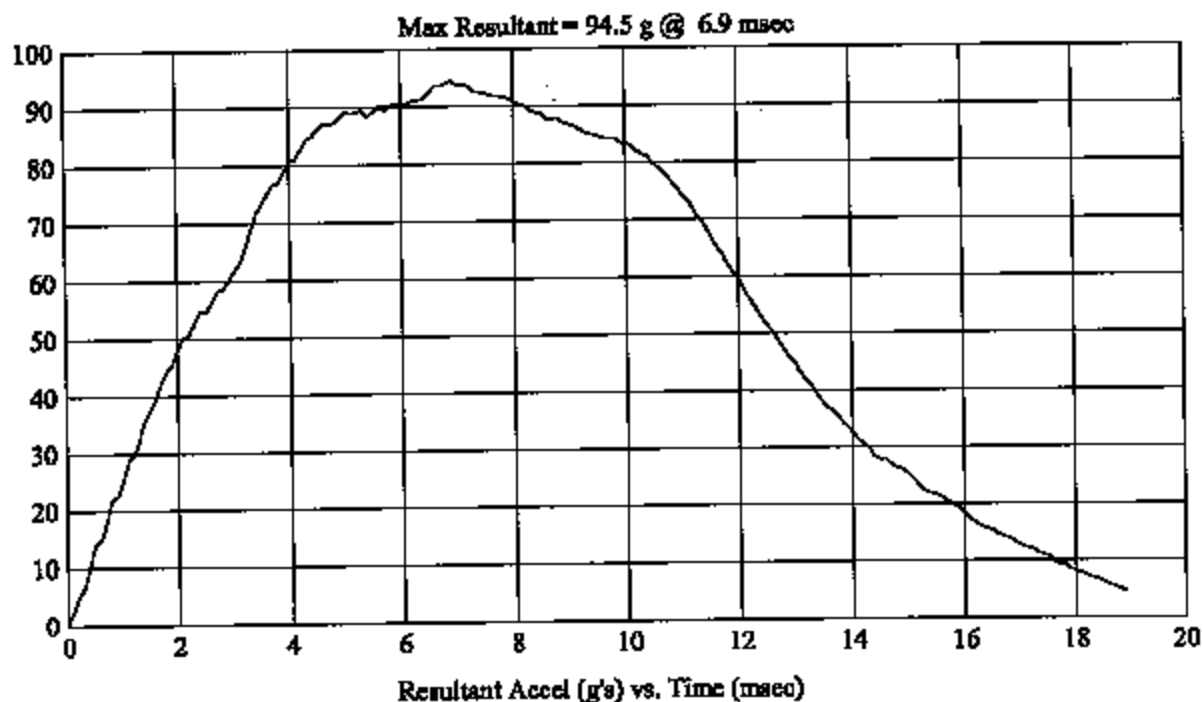
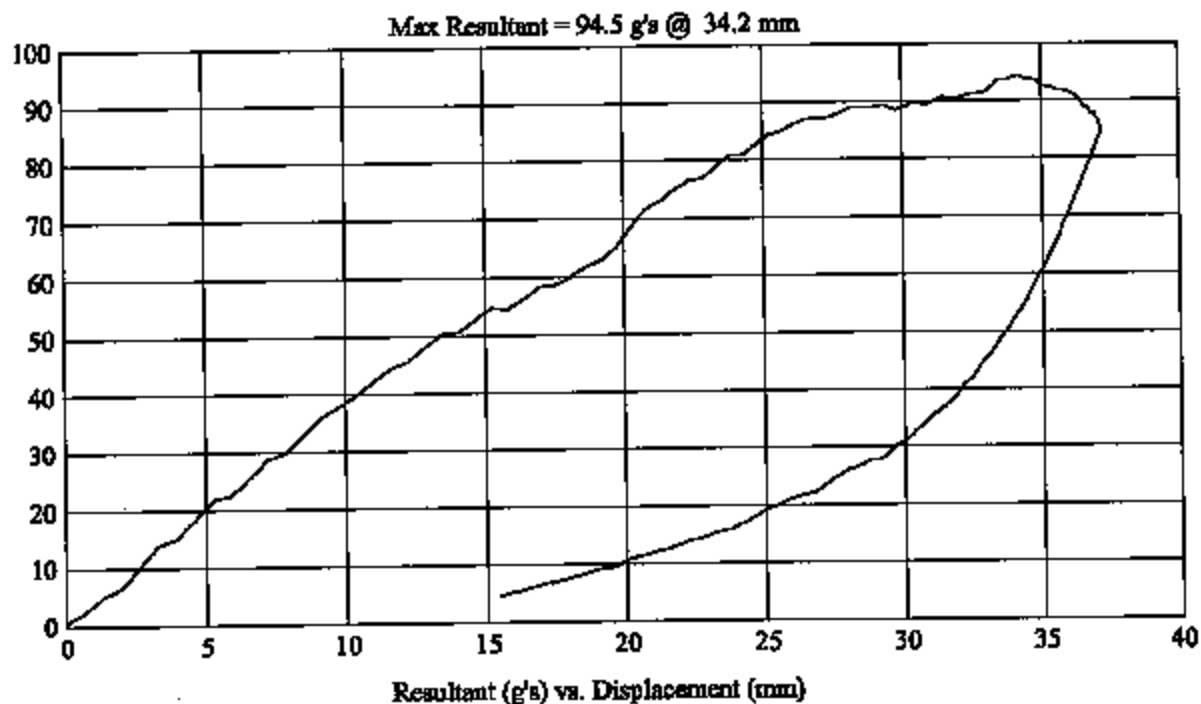
FMH
G05I7-001.8Customer: NHTSA
Test # 1
FMS151
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(d) = 614, HIC = 593, Delta T = 10.8 msec



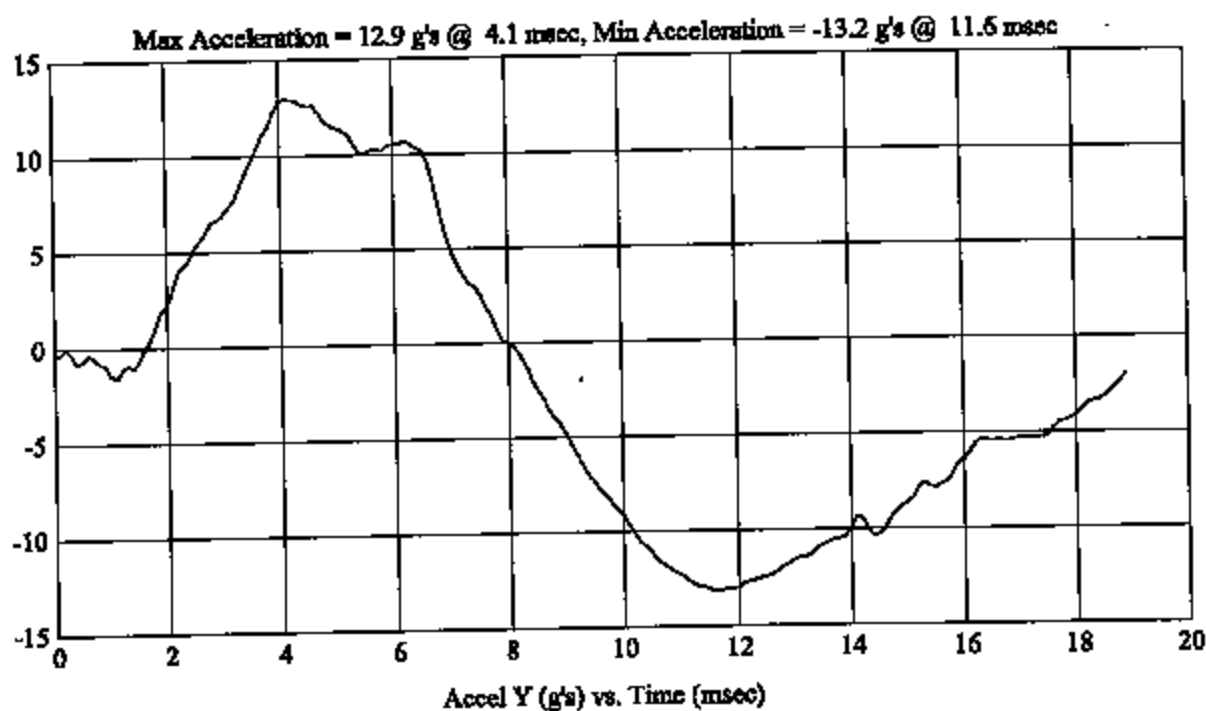
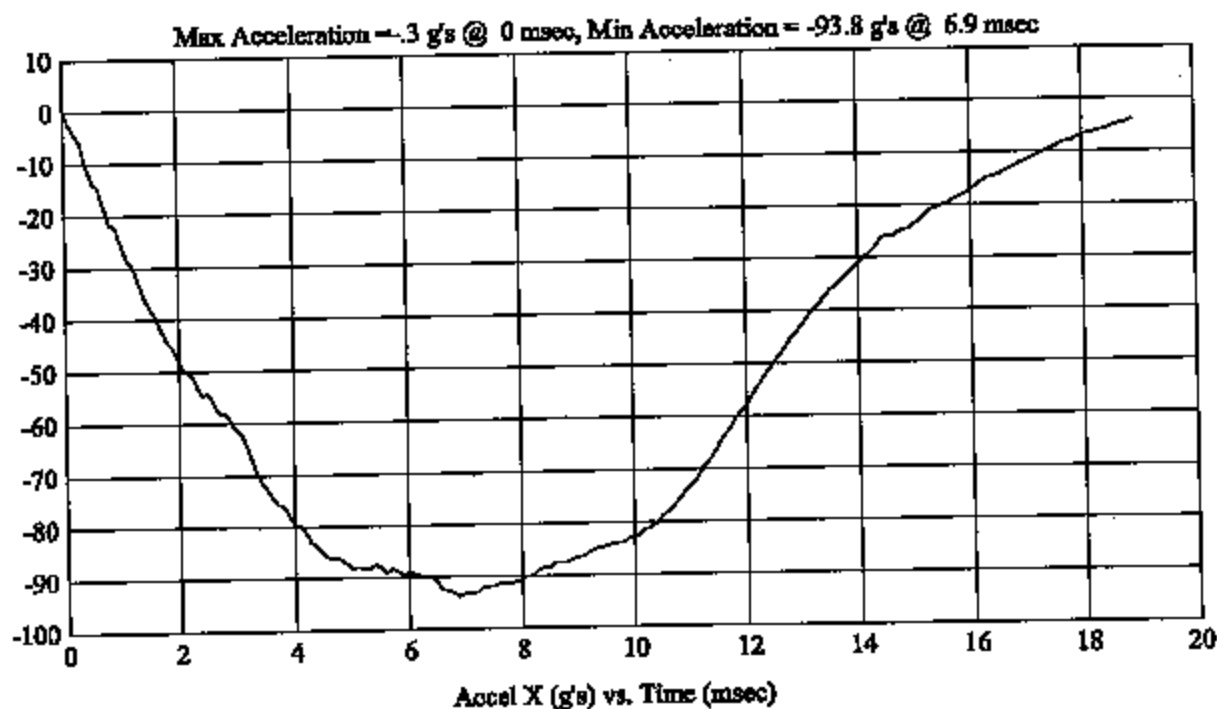
FMH
G05I7-001.8Customer: NHTSA
Test # 1
FMS151
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(d) = 614, HIC = 593, Delta T = 10.8 msec



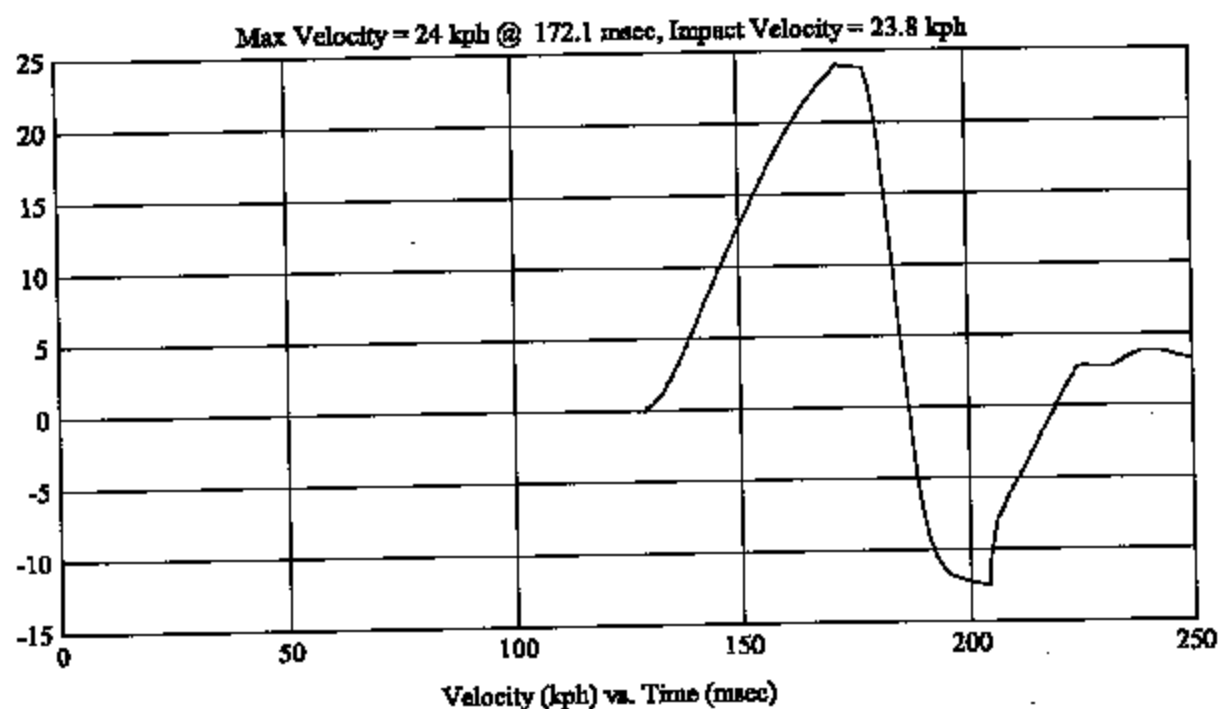
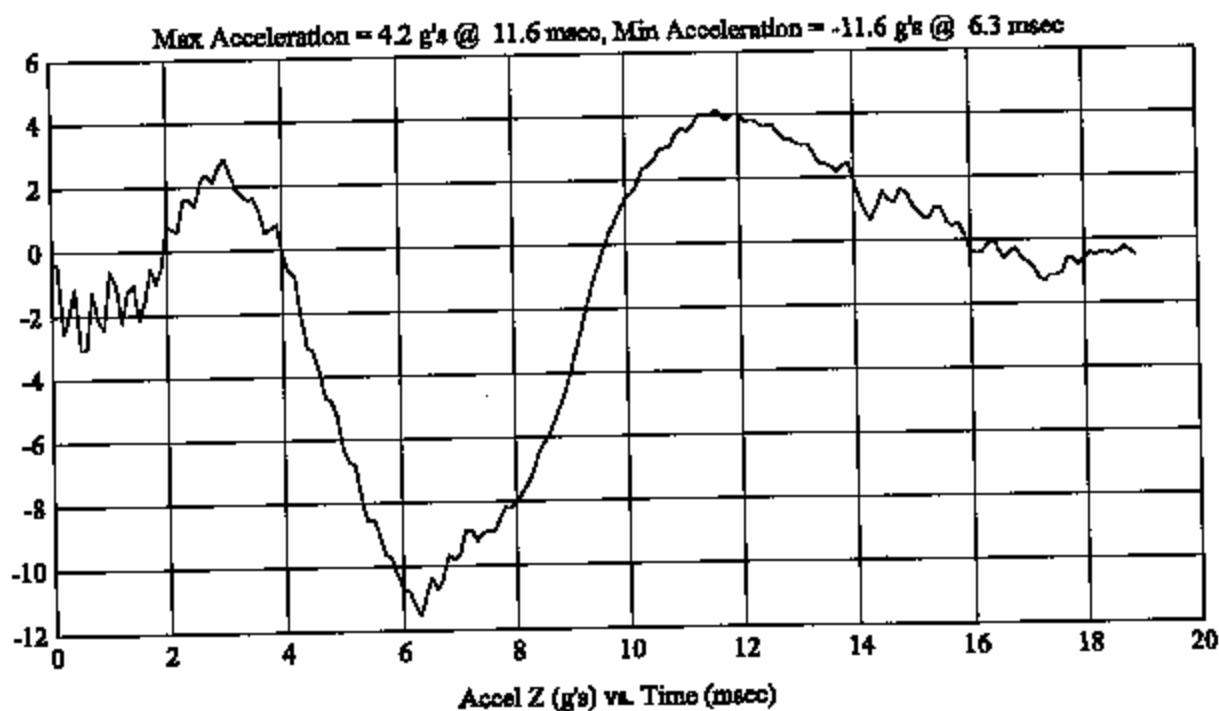
FMH
G0517-001.8Customer: NHTSA
Test # 1
FM5151
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(Δ) = 614, HIC = 593, Delta T = 10.8 msec



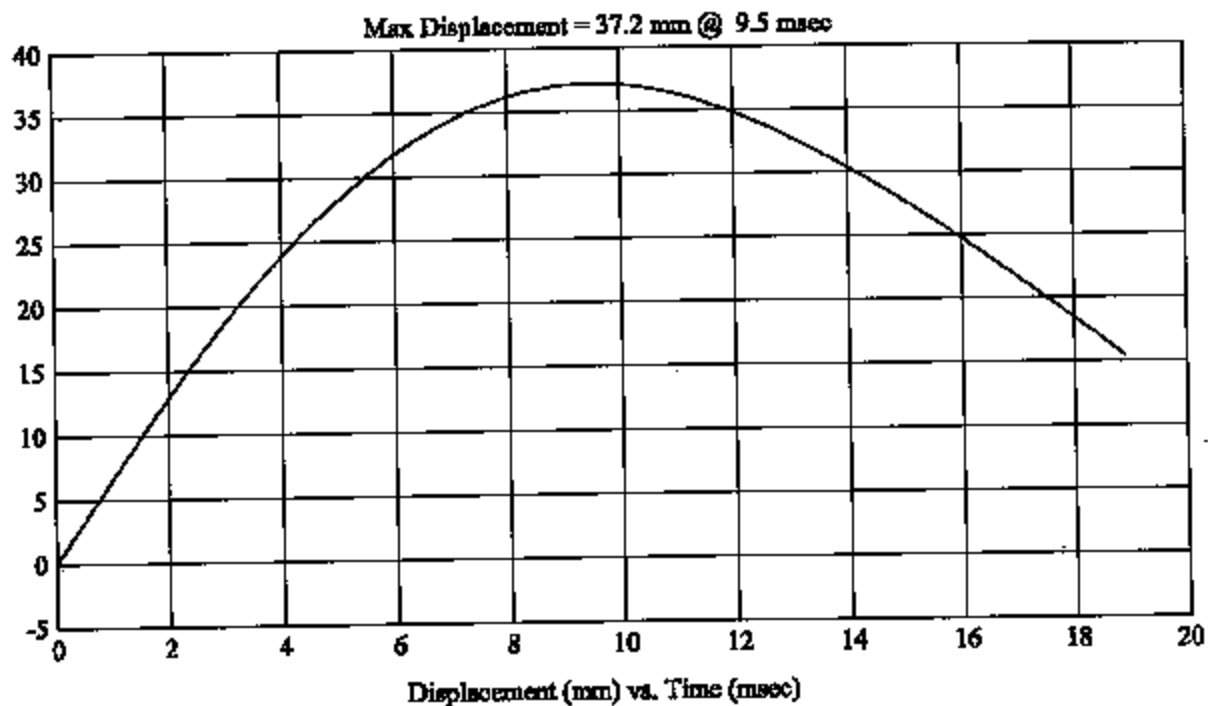
FMH
G0517-001.8Customer: NHTSA
Test # 1
FM5151
Additional Desc: N/A

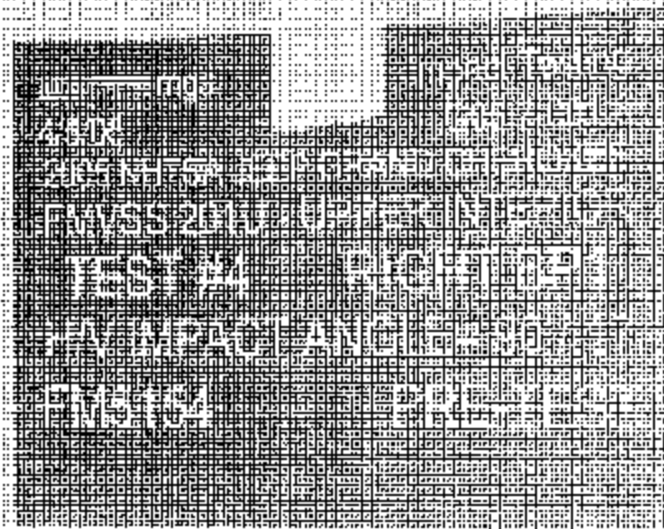
Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 159/47

HIC(d) = 614, HIC = 593, Delta T = 10.8 msec





4/5/05

4/5/05

Impact Testing

CO517-0013

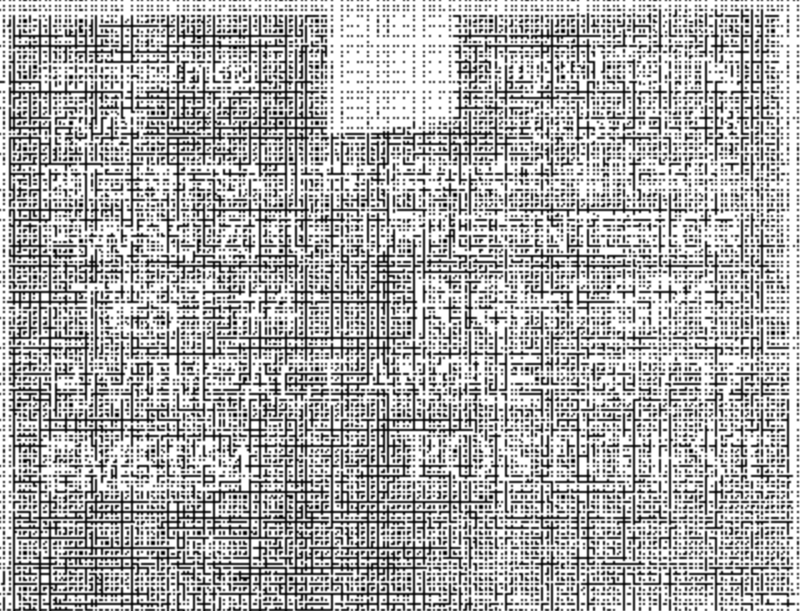
2005 NHTSA JEEP GRAND CHEROKEE

FMVSS 2010 - UPPER INTERIOR

TEST #4 - RIGHT BPI

HV IMPACT ANGLE = 90° 17

FM5154 POST TEST



MICHIGAN OPERATIONS
DATE: 2/1/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): BP1 Right

MGA Test Reference No.:FM5154

Approach Horizontal Angles:90°

Approach Vertical Angles:17°

Additional Description:

Test Number:#4

Temperature:22C

Humidity:30%

Time of Test:4:45 PM

FMH Serial No:035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
458	388	12.2	24.4	44	3 L

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7284-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35824	-94.1	1.28	1.30
Y	6	J35819	94.3	1.54	1.54
Z	7	J22864	92.7	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: [Signature] Approved By: [Signature] Date: 4/5/05

*Only necessary for NHTSA (Government) Compliance testing.

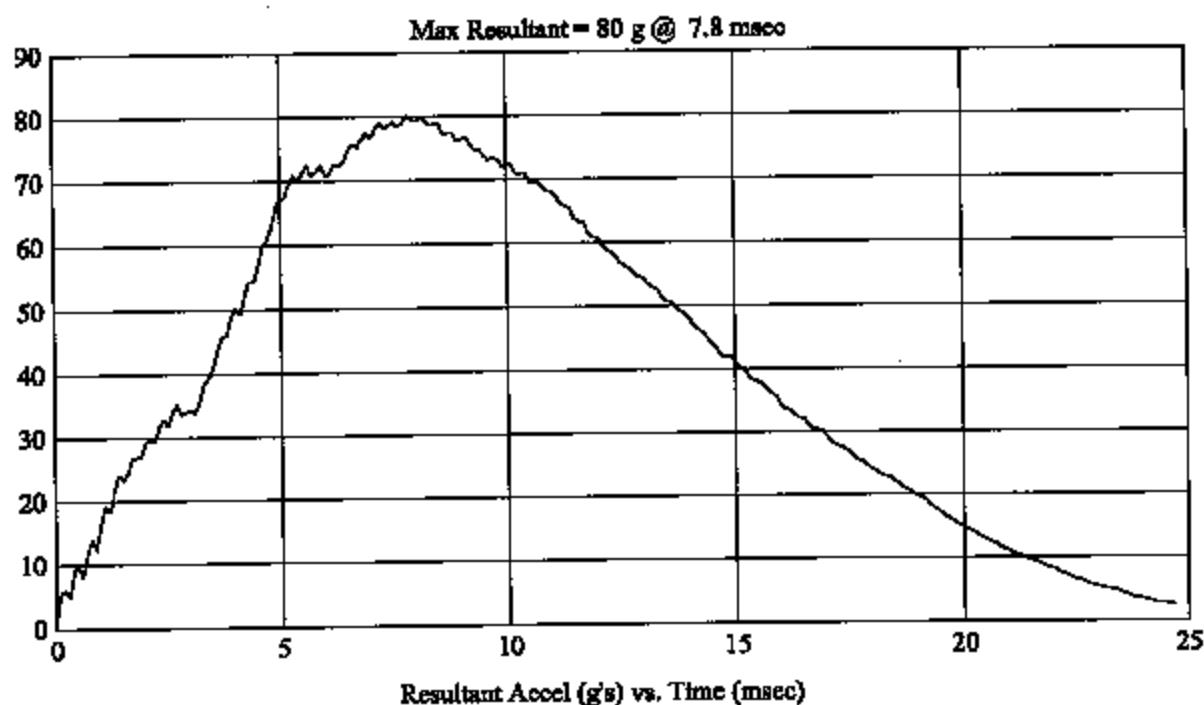
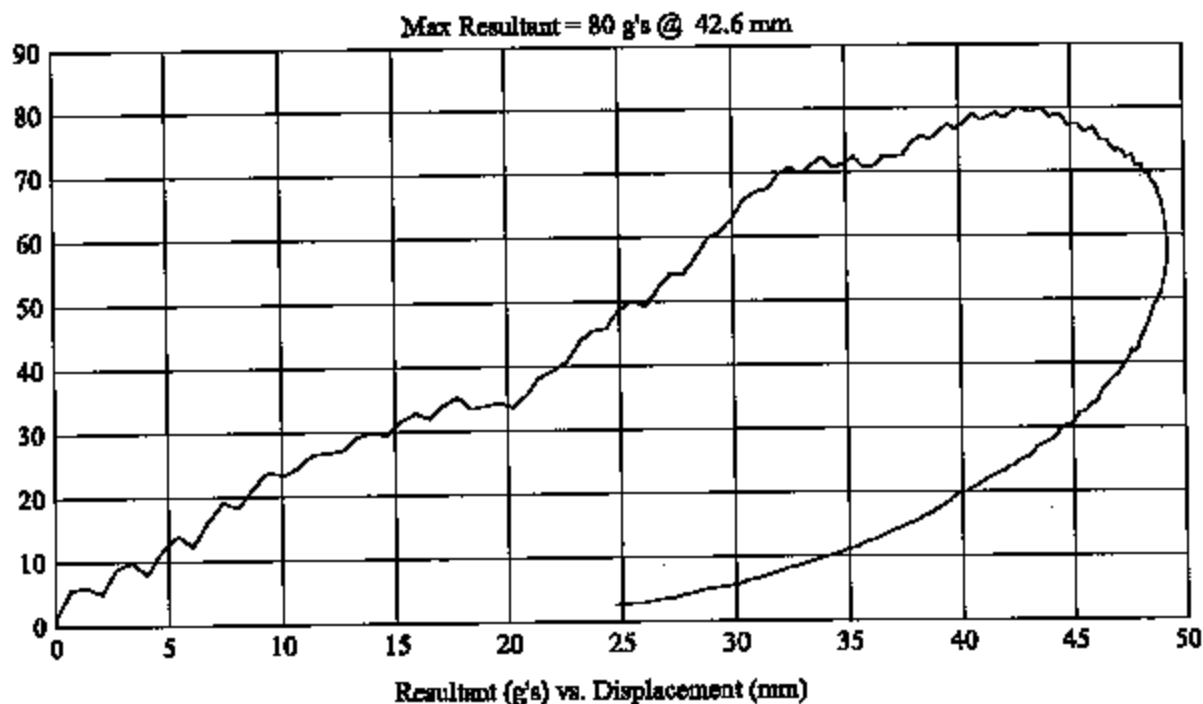
FMH
G0517-001.8Customer: NHTSA
Test # 4
FM5154
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP1
Vehicle Side: Right
Horz/Vert Angle: 90/17

HIC(d) = 458, HIC = 386, Delta T = 12.2 msec



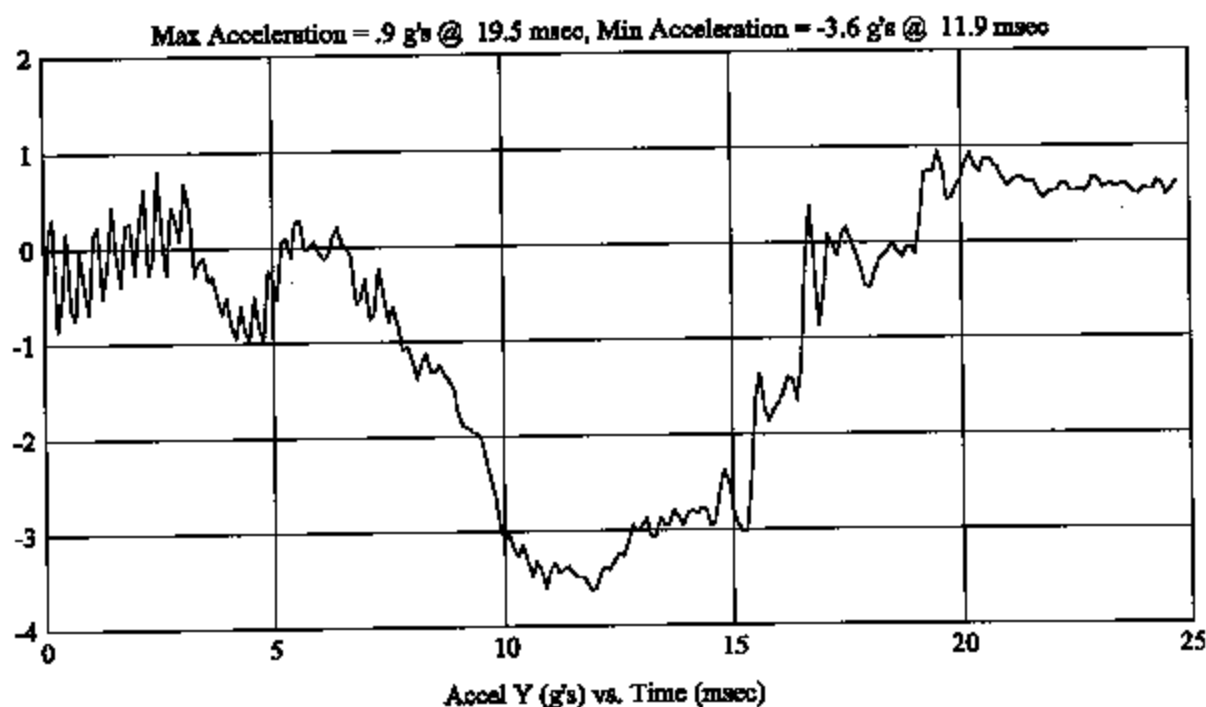
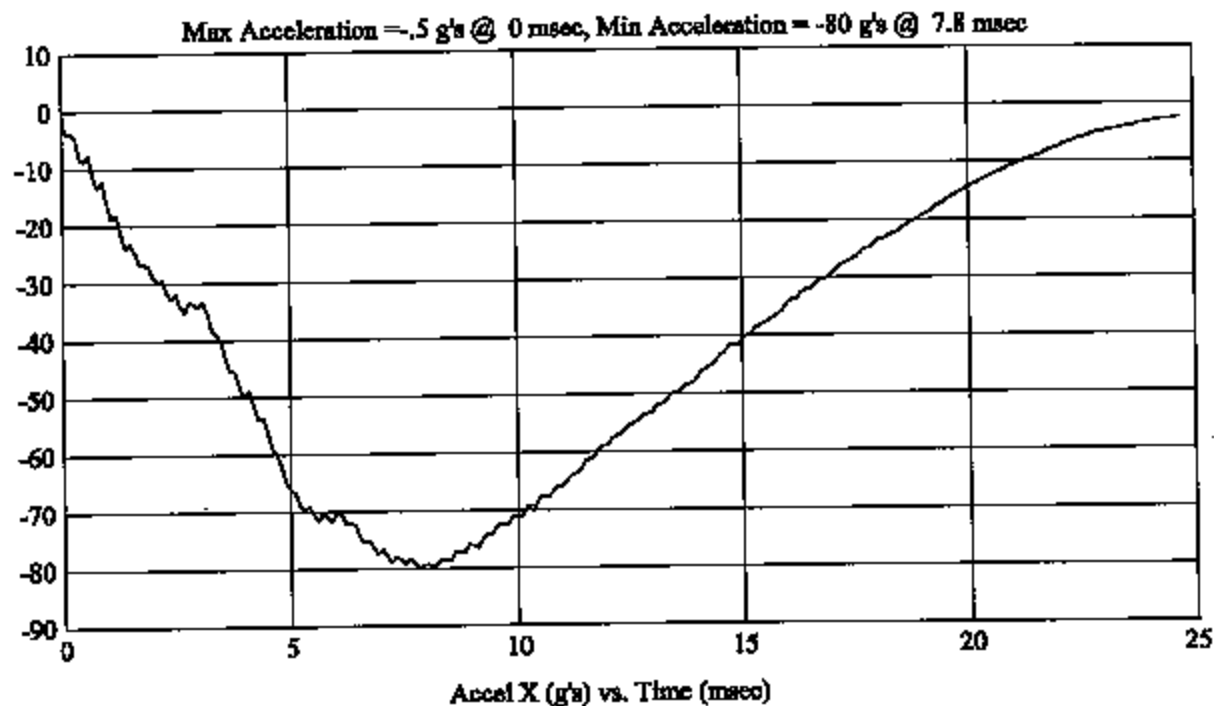
FMH
G0517-001.8Customer: NHTSA
Test # 4
FM5154
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP1
Vehicle Side: Right
Horz/Vert Angle: 90/17

HIC(d) = 458, HIC = 386, Delta T = 12.2 msec



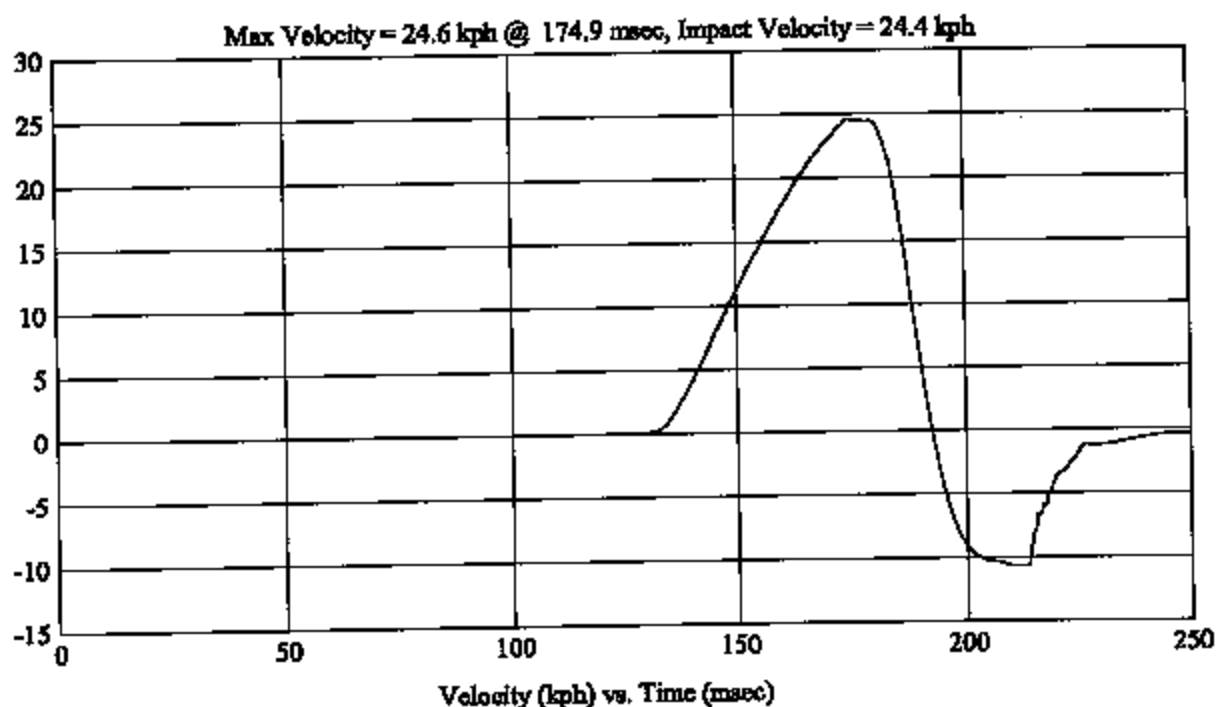
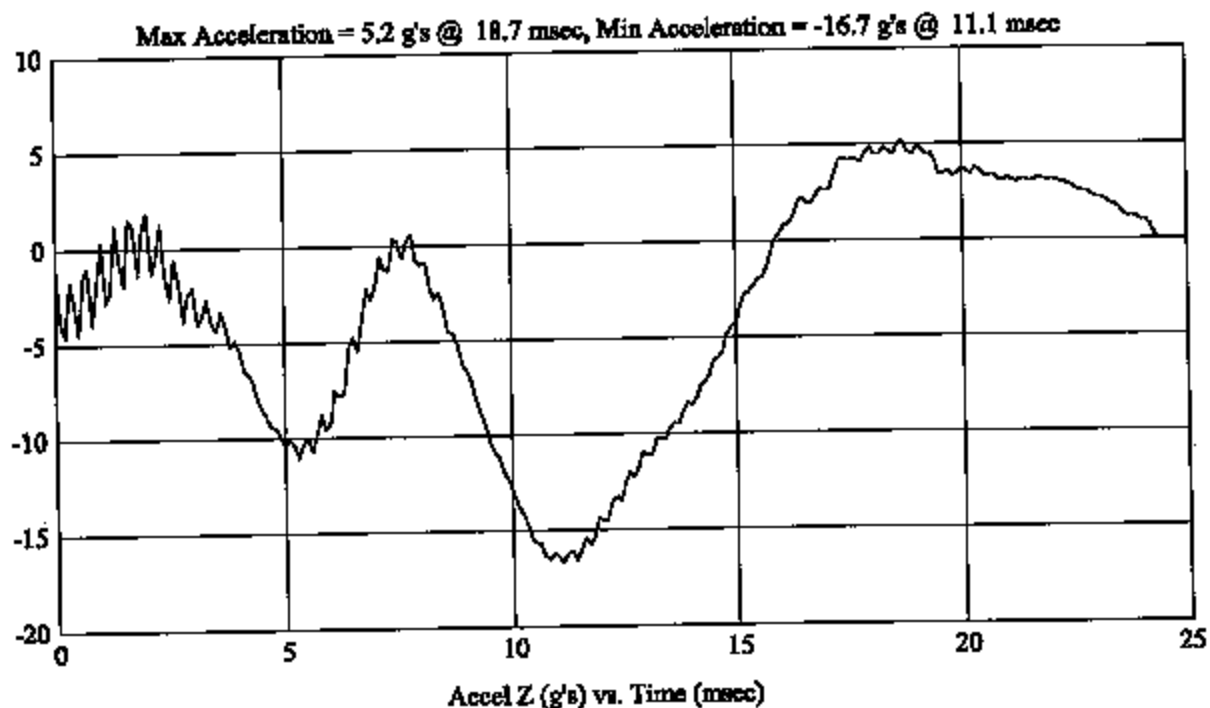
FMH
G05I7-001.8Customer: NHTSA
Test # 4
FM5154
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP1
Vehicle Side: Right
Horz/Vert Angle: 90/17

HIC(d) = 458, HIC = 386, Delta T = 12.2 msec



FMH
G0517-001.8

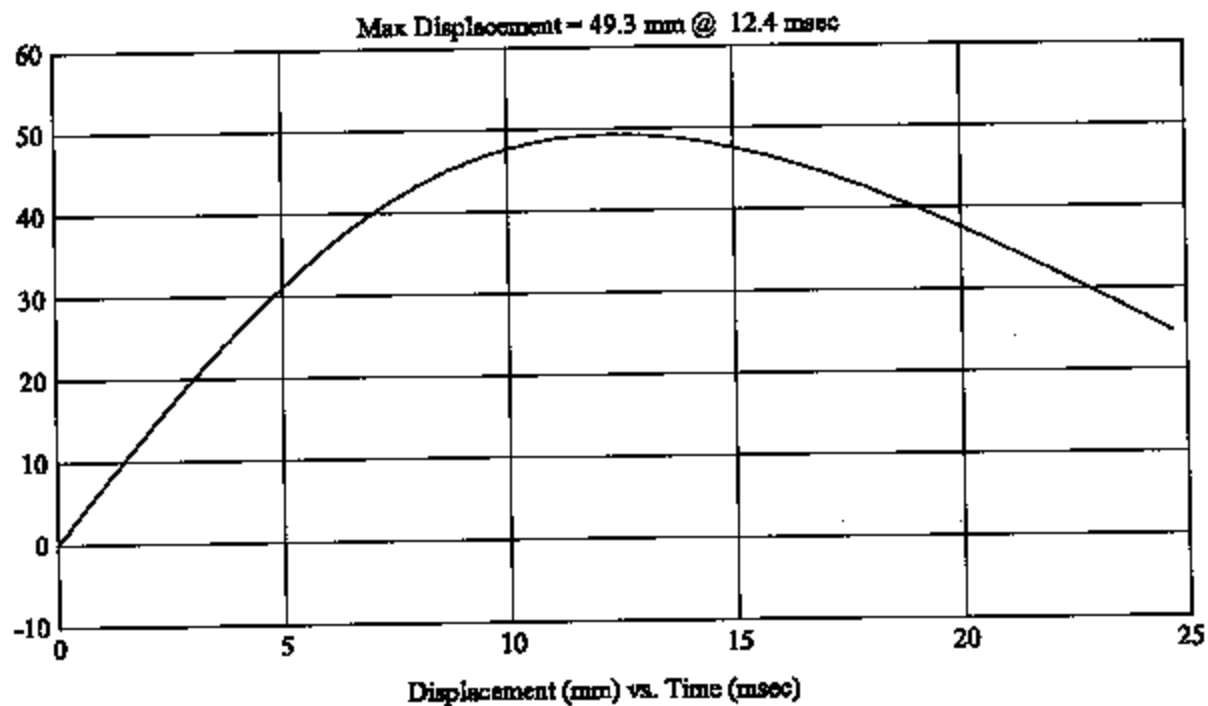
Customer: NHTSA
Test # 4
FM5154
Additional Desc: N/A

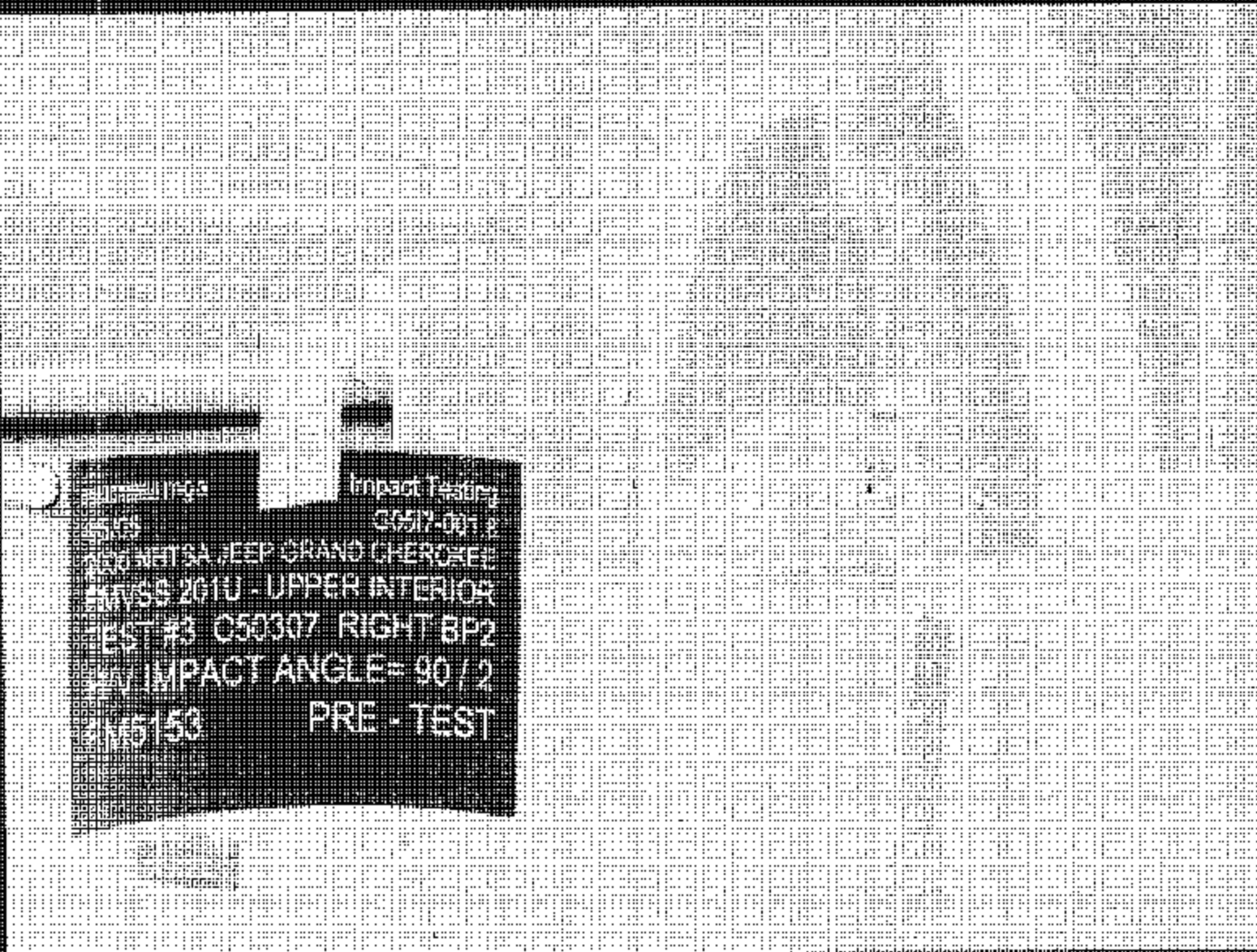
Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP1
Vehicle Side: Right
Hnz/Vert Angle: 90/17

HIC(d) = 458, HIC = 386, Delta T = 12.2 msec





Impact Testing
C5517-001 P
NETSA JEEP GRAND CHEROKEE
CLASS 201U - UPPER INTERIOR
EST #3 C50307 RIGHT BP2
IMPACT ANGLE= 90 / 2
15150 PRE - TEST

IMPACT TESTING
G0517 001.8
NHTSA JEEP GRAND CHEROKEE
FMVSS 2010 - UPPER INTERIOR
TEST #3 C50307 RIGHT BP2
IMPACT ANGLE = 90 / 2
POST-TEST
H05153



MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): BP2 Right

MGA Test Reference No.:FM5153

Approach Horizontal Angles:90°

Approach Vertical Angles:2°

Additional Description:

Test Number:#3

Temperature:22F

Humidity:30%

Time of Test:2:45 PM

FMH Serial No:038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
722	737	4.8	24.4	20	3 R

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-110	1.30	1.30
Y	6	J36193	101.9	1.54	1.54
Z	7	J36353	96.7	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: M. J. M. Approved By: [Signature] Date: 4/5/05

*Only necessary for NHTSA (Government) Compliance testing.

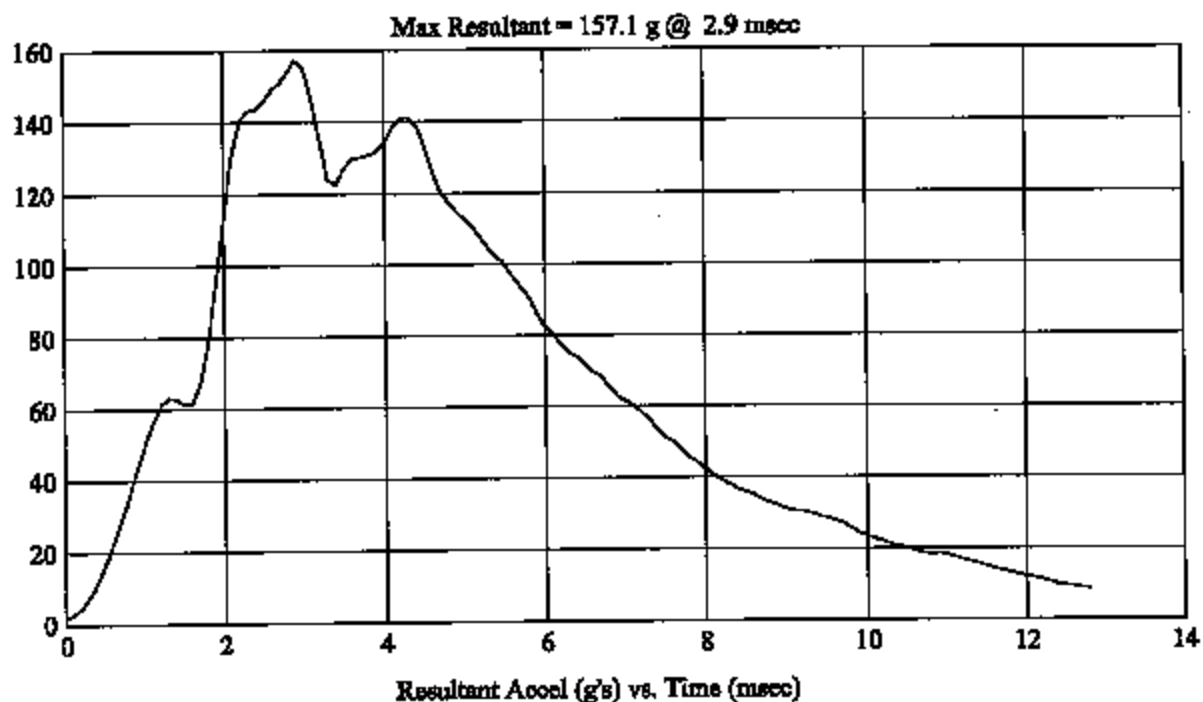
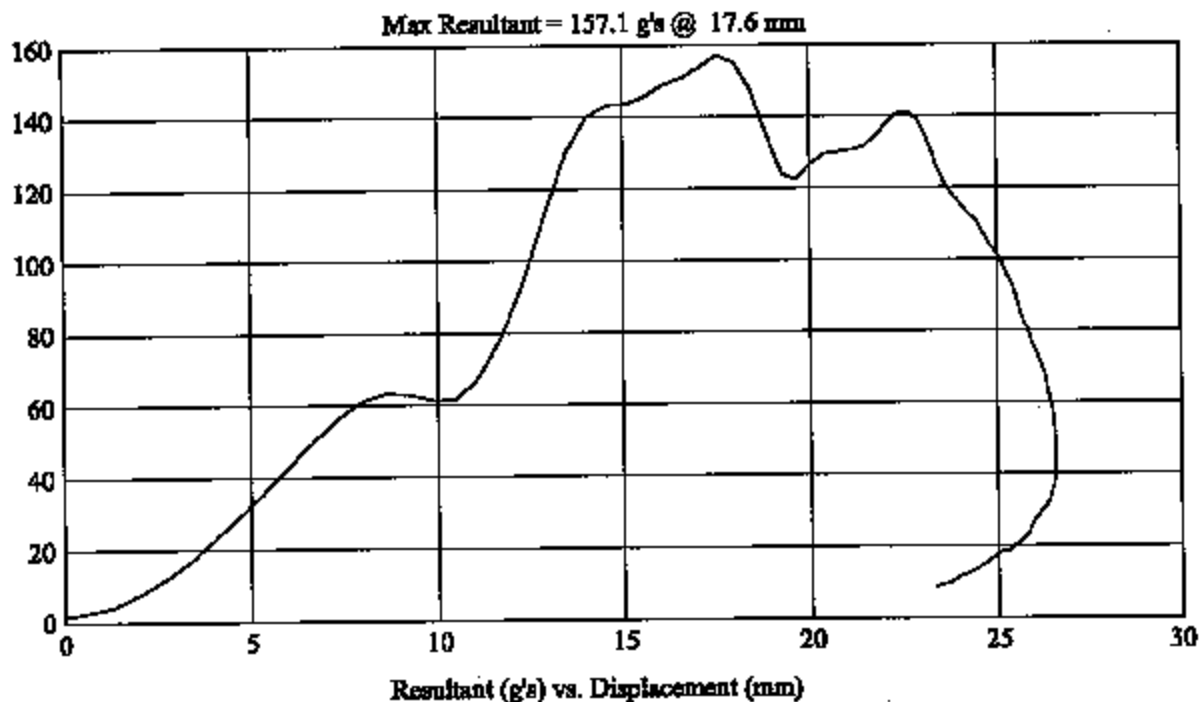
FMH
G0517-001.8Customer: NHTSA
Test # 3
FM5153
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/2

HIC(d) = 722, HIC = 737, Delta T = 4.8 msec



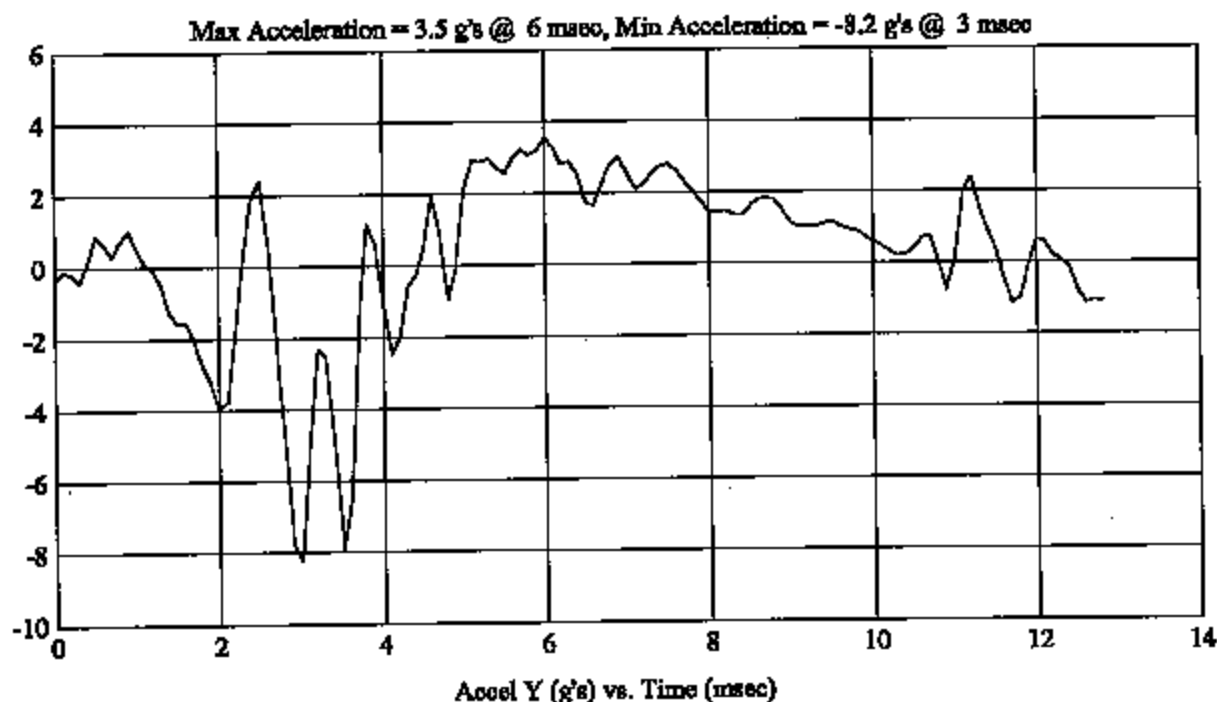
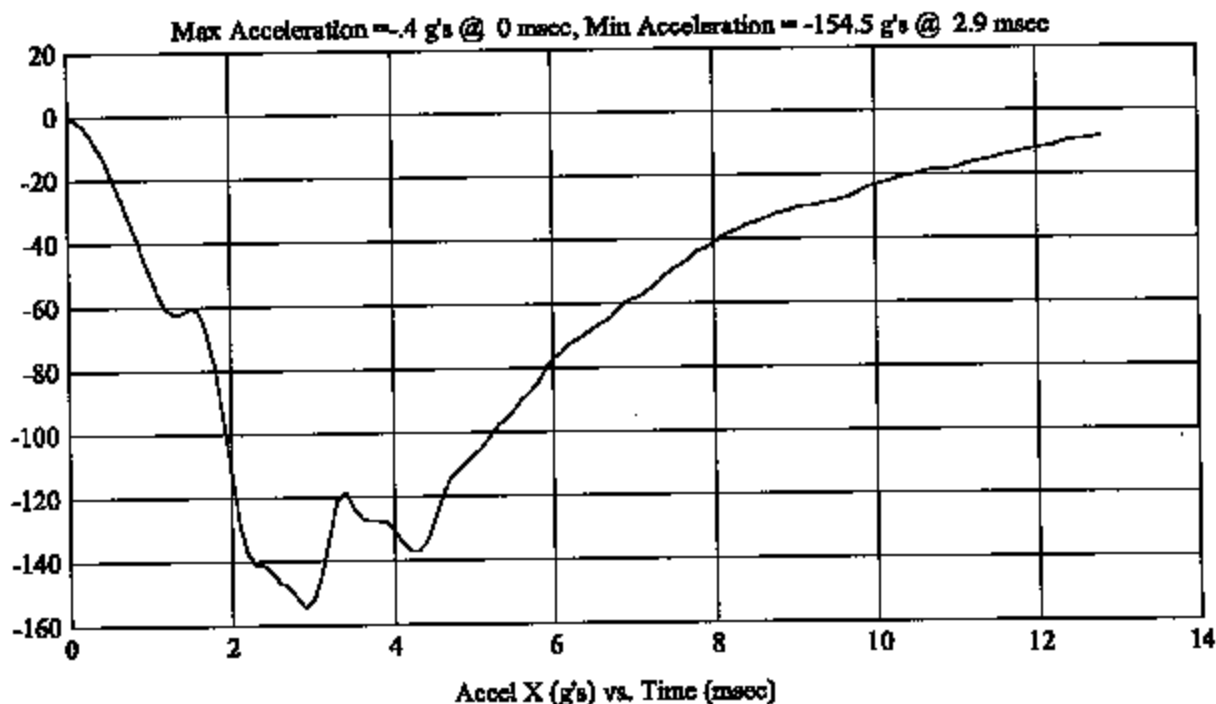
FMH
G05I7-001.8Customer: NHTSA
Test # 3
FM5153
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/2

HIC(d) = 722, HIC = 737, Delta T = 4.8 msec



FMH
G05I7-001.8

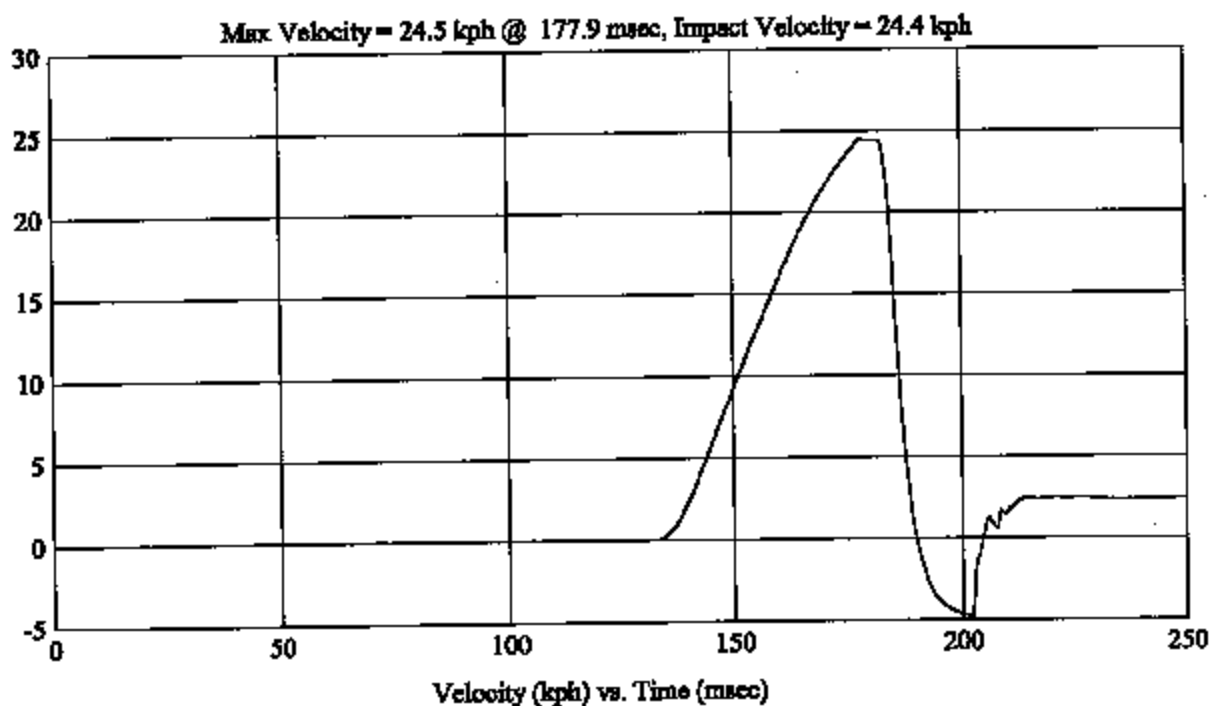
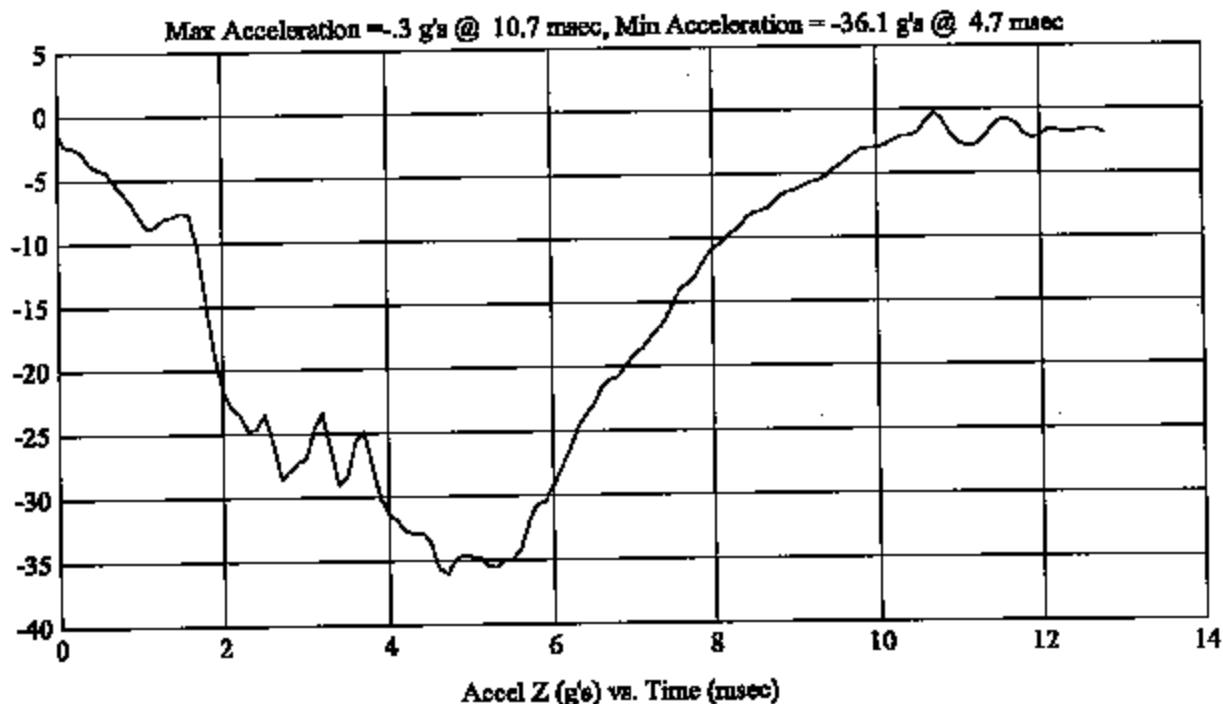
Customer: NHTSA
Test # 3
FM5153
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/2

HIC(d) = 722, HIC = 737, Delta T = 4.8 msec



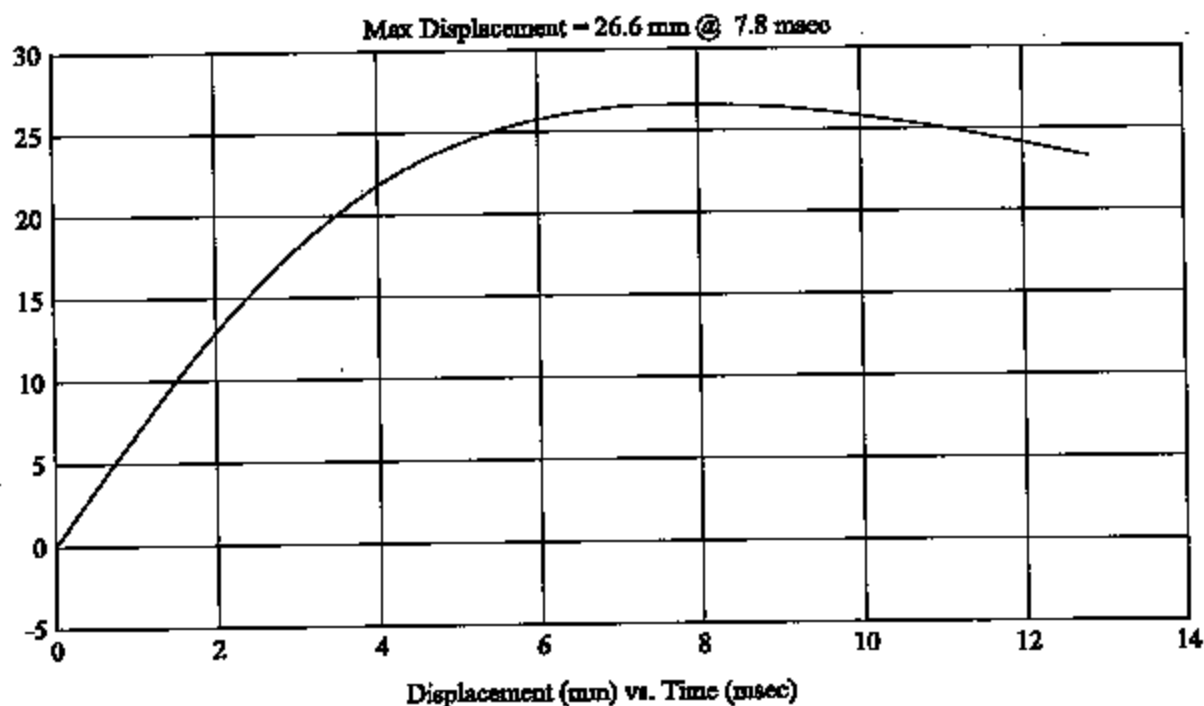
FMH
G0517-001.8Customer: NHTSA
Test # 3
FMS153
Additional Desc: N/A

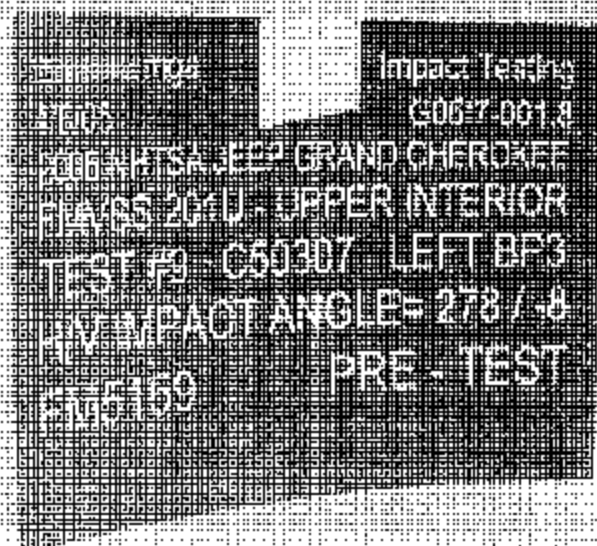
Vehicle Program : Jeep Grand Cherokee

Test Date: 4/5/05

Model Year: 2005
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/2

HIC(d) = 722, HIC = 737, Delta T = 4.8 msec





1193

Impact Testing

4/6/05

GC517-001 &

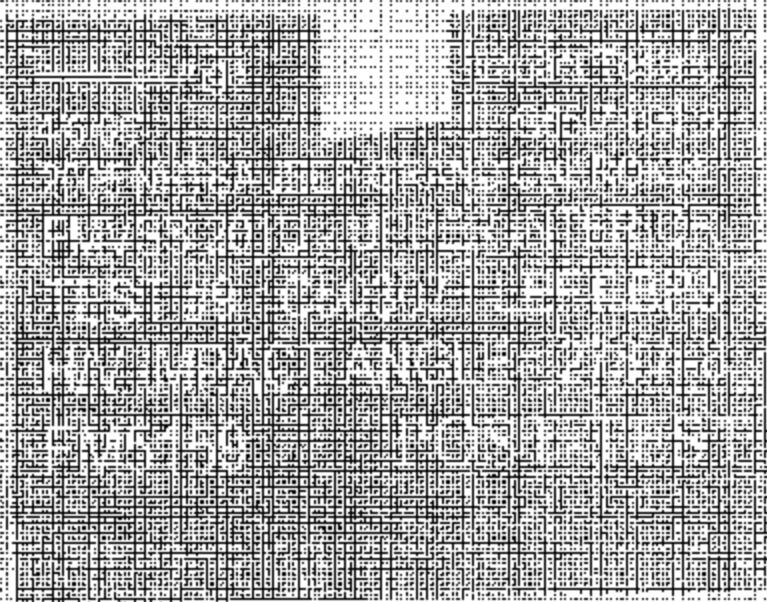
2005 NHTSA JEEP GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #9 C50307 LEFT BP3

H/V IMPACT ANGLE = 278 / -8

FMVSS 59 POST-TEST



MICHIGAN OPERATIONS
DATE: 2/1/01
SUPERSEDES: MGATP207210.2

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SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): BP3 Left

MGA Test Reference No.:FM5159

Approach Horizontal Angles:278°

Approach Vertical Angles:-8°

Additional Description:

Test Number:#9

Temperature:22C

Humidity:44%

Time of Test:3:45 PM

FMH Serial No:038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
594	566	7.1	24.1	33	10 L

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-110	1.44	1.44
Y	6	J36193	101.9	1.54	1.54
Z	7	J36353	96.7	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: [Signature] Approved By: [Signature] Date: 4/6/05

*Only necessary for NHTSA (Government) Compliance testing.

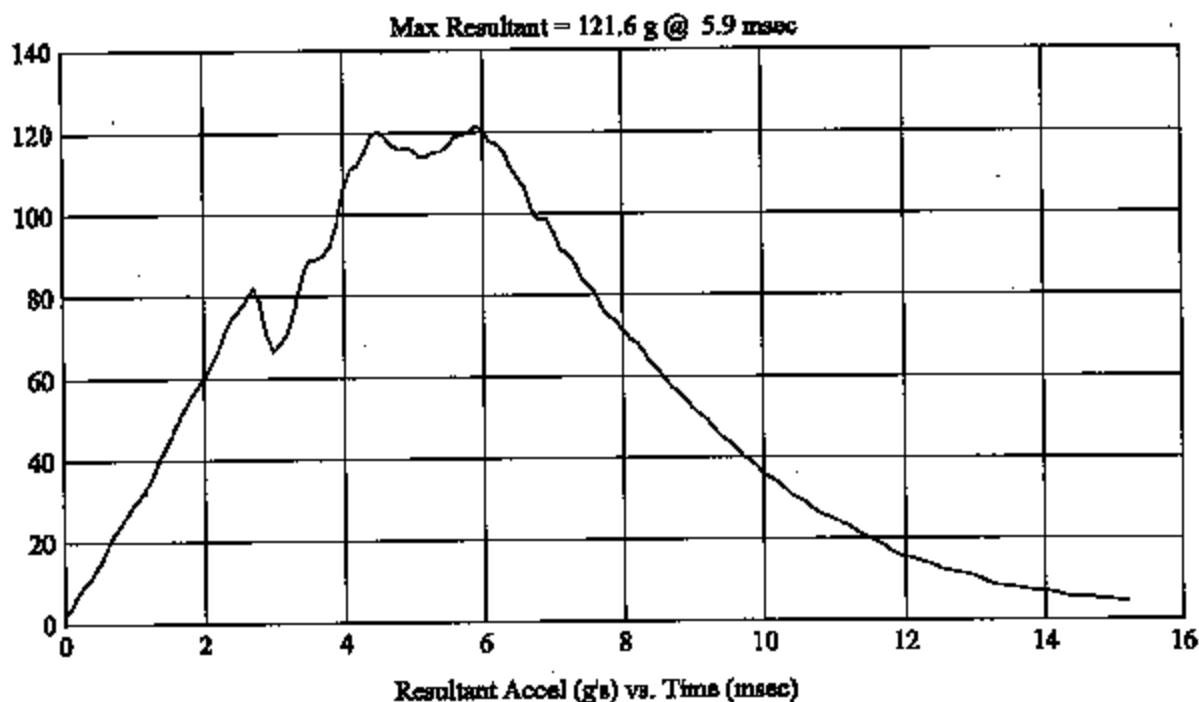
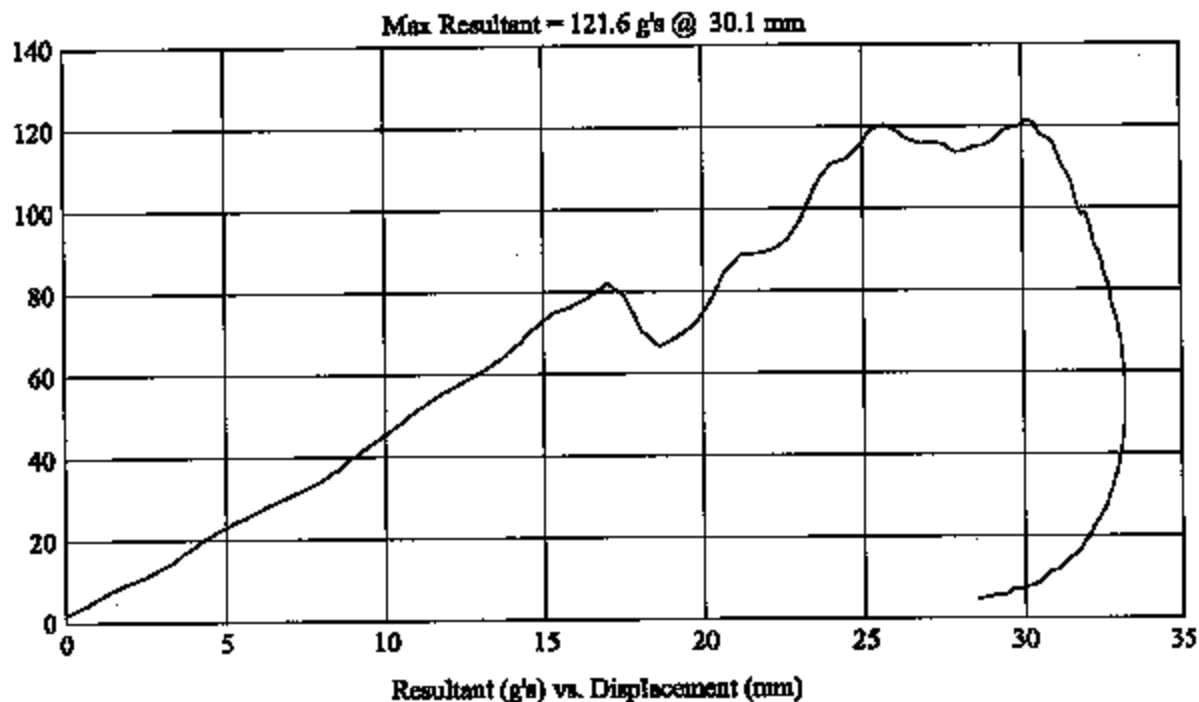
FMH
G0517-001.8Customer: NHTSA
Test # 9
FM5159
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 278/-8

HIC(d) = 594, HIC = 566, Delta T = 7.1 msec



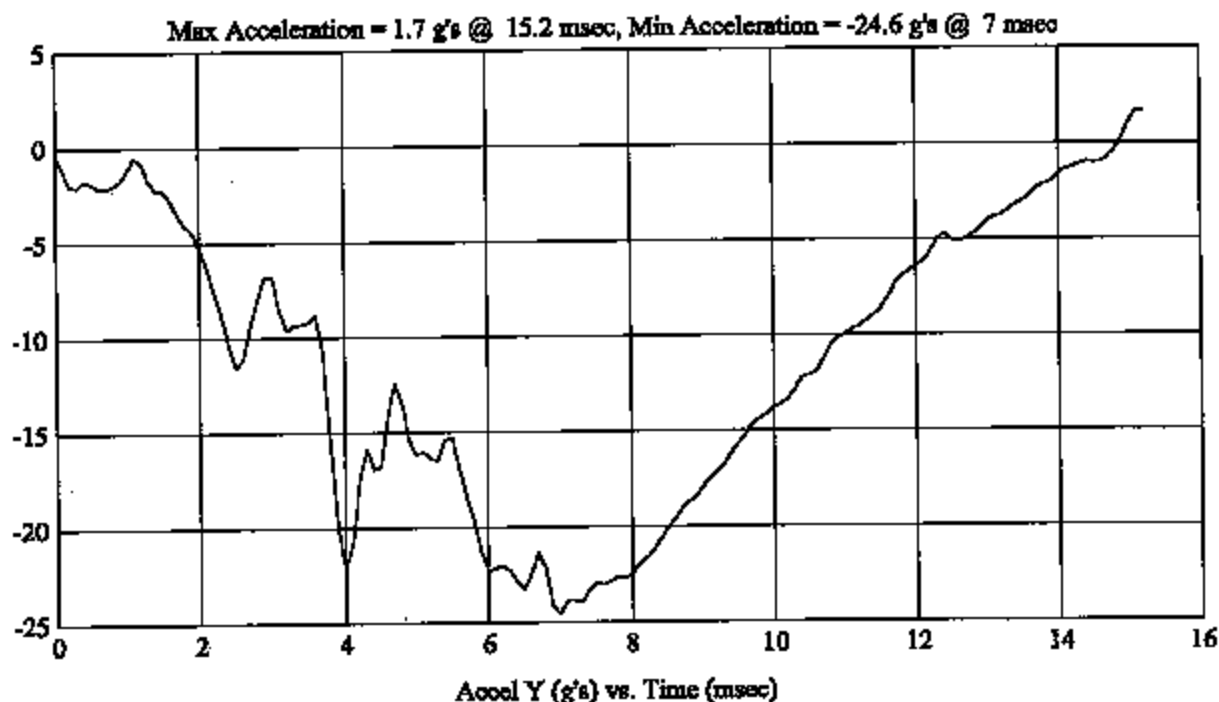
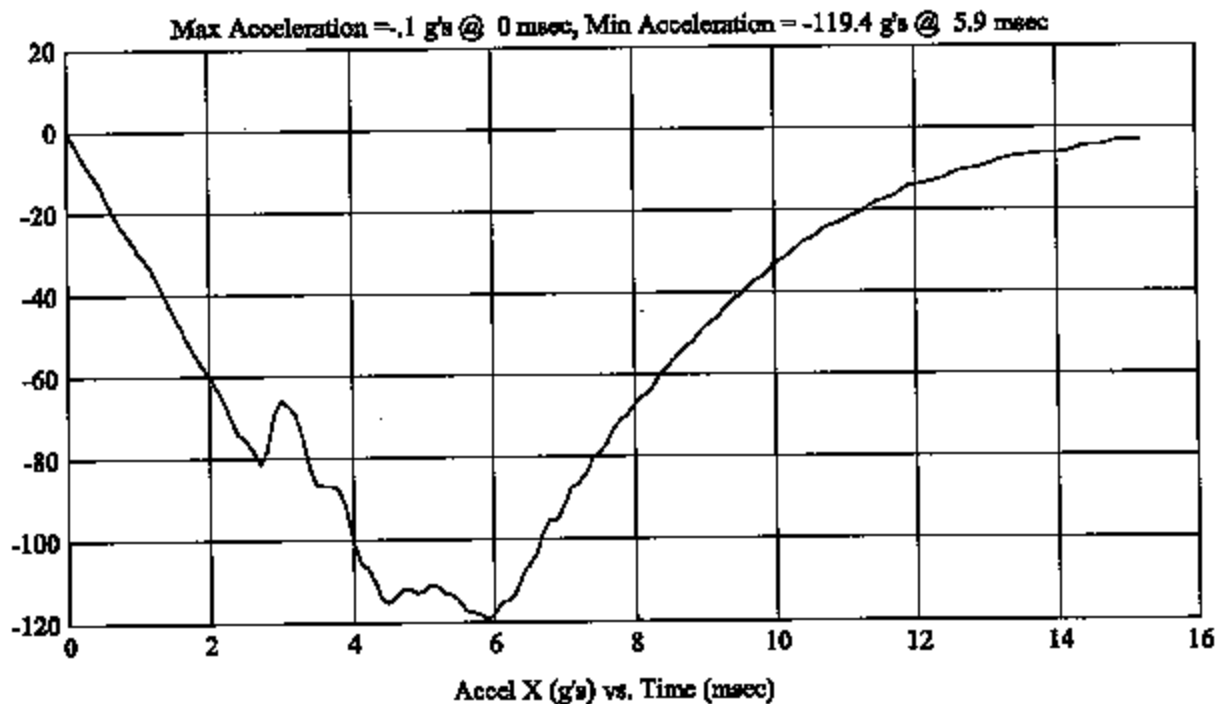
FMH
G0517-001.8Customer: NHTSA
Test # 9
FMS159
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 278/-8

HIC(d) = 594, HIC = 566, Delta T = 7.1 msec



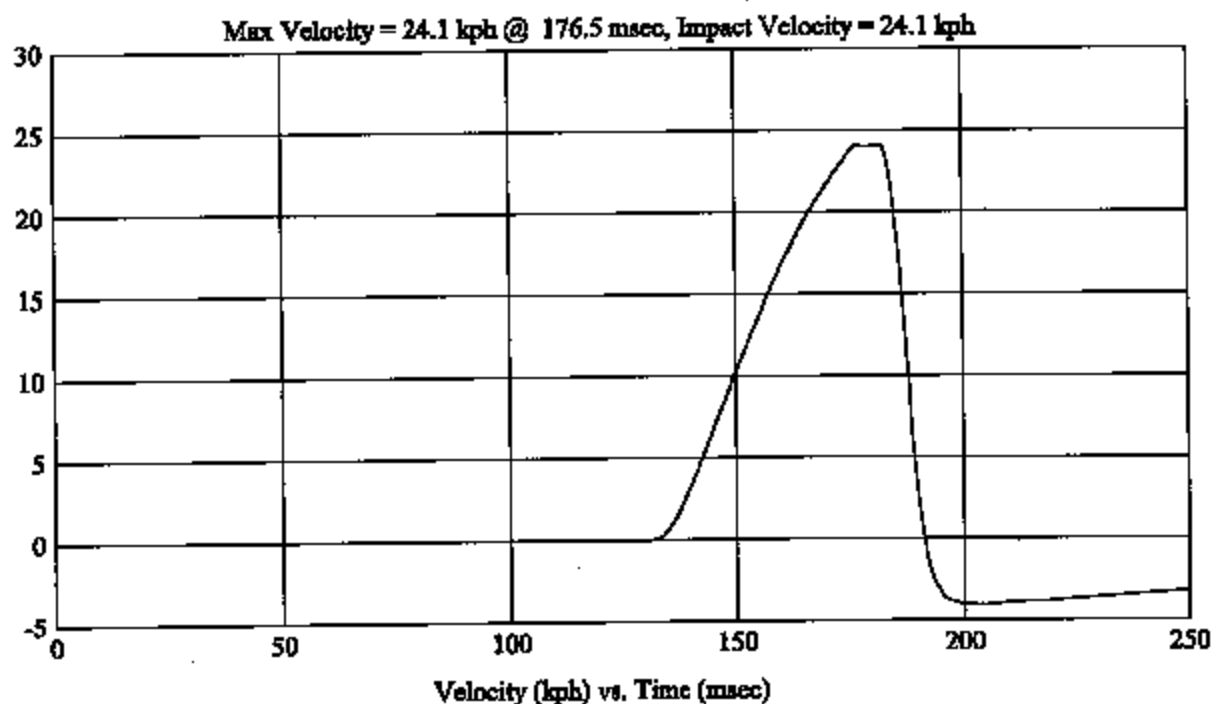
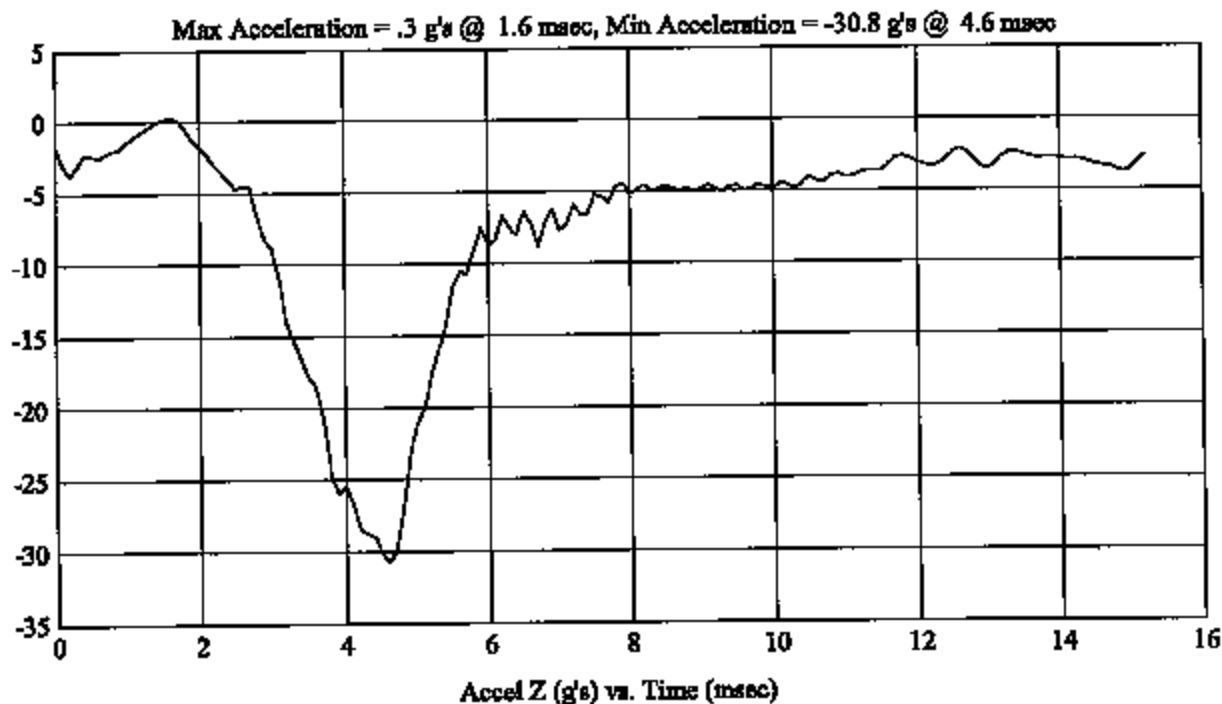
FMH
G05I7-001.8Customer: NHTSA
Test # 9
FM5159
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 278/-8

HIC(d) = 594, HIC = 566, Delta T = 7.1 msec



FMH
G05I7-001.8

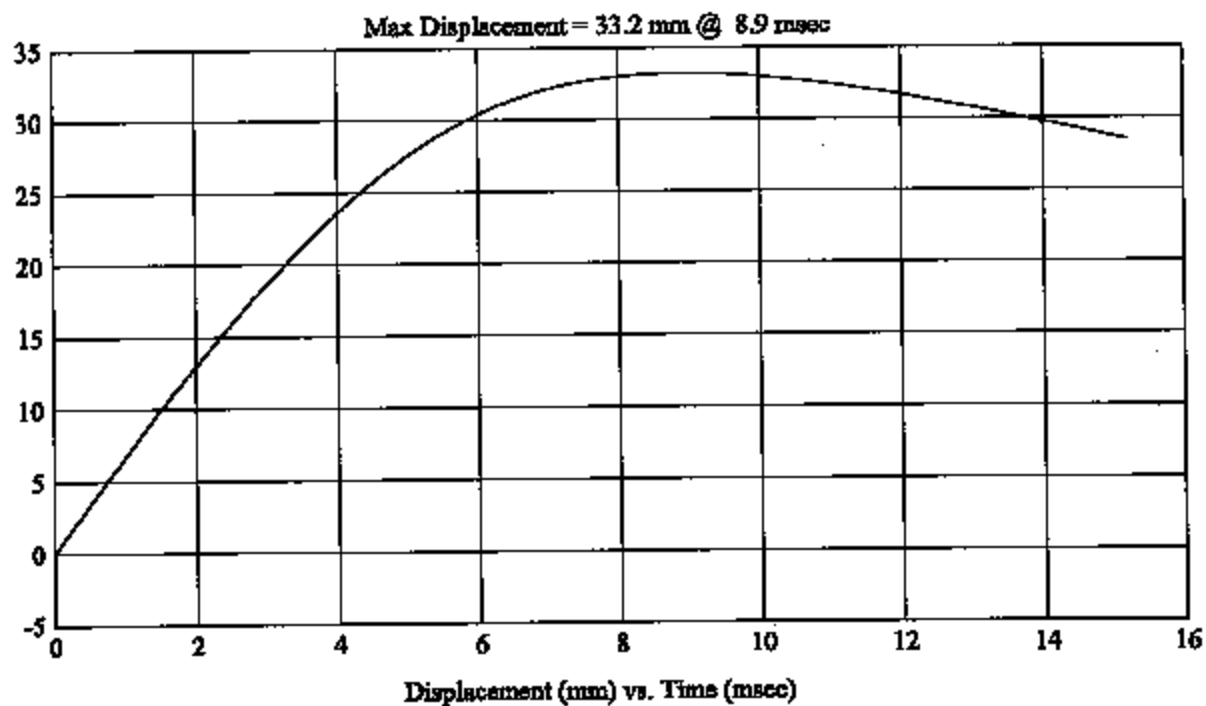
Customer: NHTSA
Test # 9
FMS159
Additional Desc: N/A

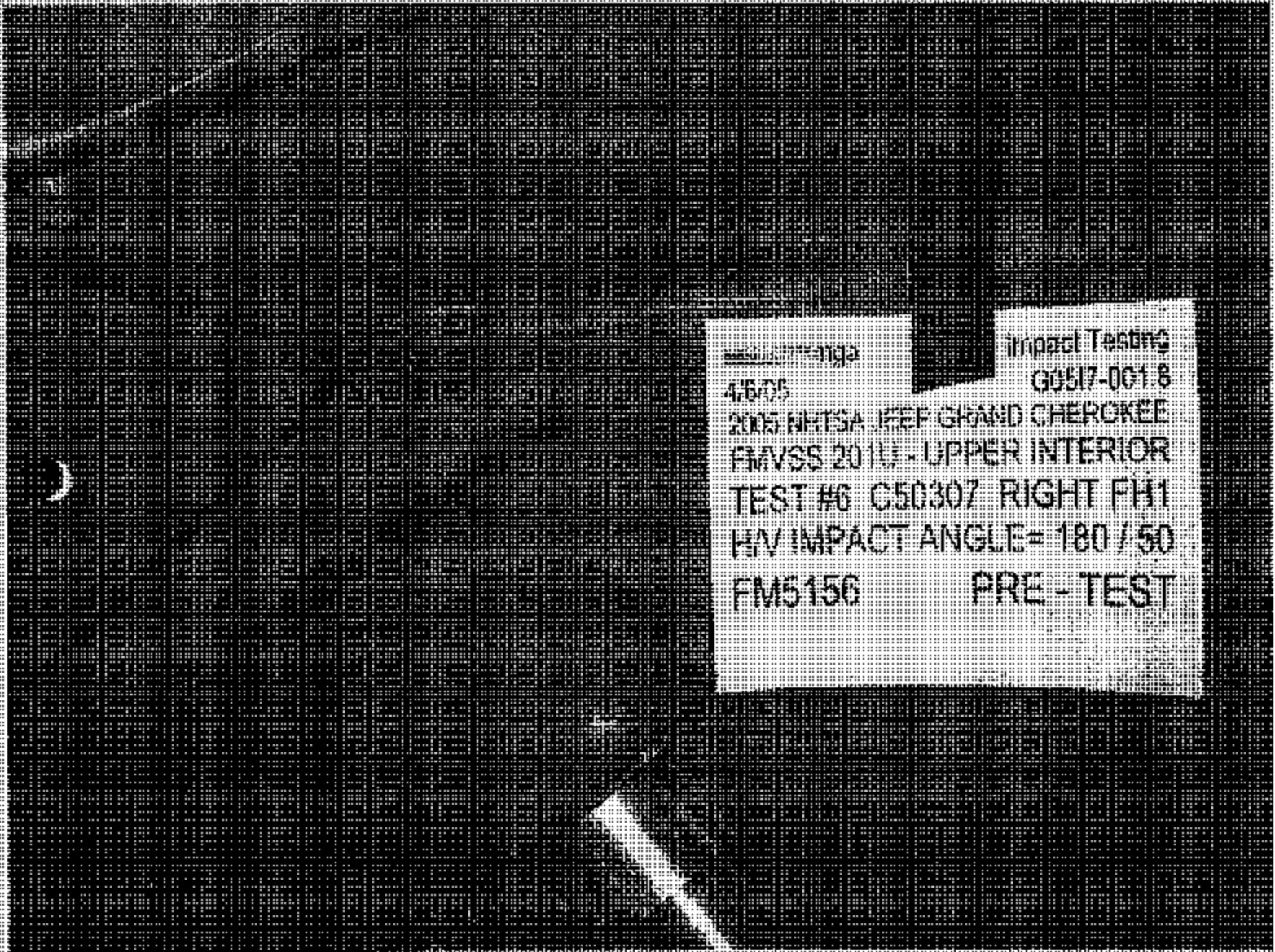
Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 278/-8

HIC(d) = 594, HIC = 566, Delta T = 7.1 msec





4/6/05

4/6/05

2005 NHTSA JEEP GRAND CHEROKEE
FMVSS 2010 - UPPER INTERIOR
TEST #6 C50307 RIGHT FH1
HV IMPACT ANGLE= 180 / 50
FM5156 PRE - TEST

Impact Testing

G0517-001.8

4/6/05

Impact Testing

G0517-001.3

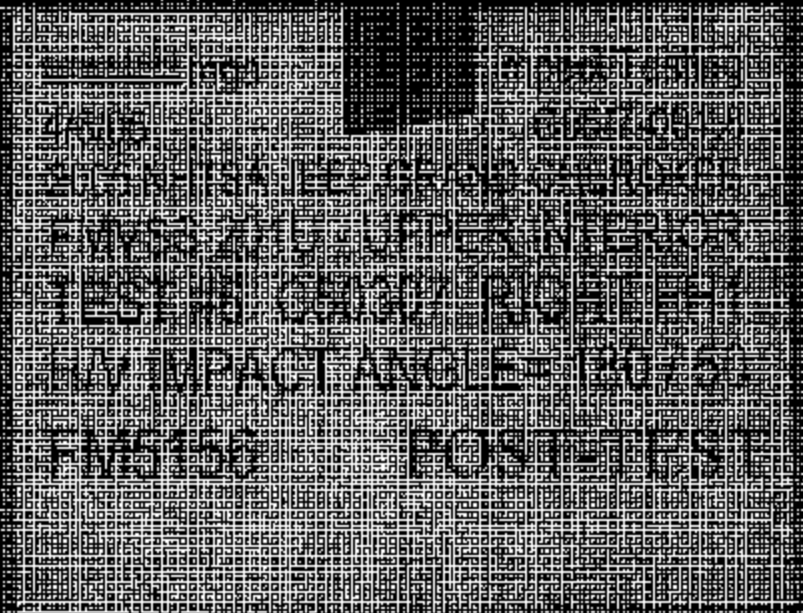
2005 NHTSA JEEP GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #6 C50307 RIGHT FH1

H/V IMPACT ANGLE = 180 / 50

FM5156 POST-TEST



MICHIGAN OPERATIONS
DATE: 2/1/01
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SUMMARY OF FMVSS 2010 TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#8

Target (Vehicle Side): FH1 Right

Temperature:22C

MGA Test Reference No.:FM5156

Humidity:38%

Approach Horizontal Angles:180°

Time of Test:10:00 AM

Approach Vertical Angles:50°

FMH Serial No:038

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
486	423	14.2	24.0	43	37 R

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-110	1.44	1.44
Y	6	J36193	101.9	1.54	1.54
Z	7	J36353	98.7	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: [Signature] Approved By: [Signature] Date: 4/8/05

*Only necessary for NHTSA (Government) Compliance testing.

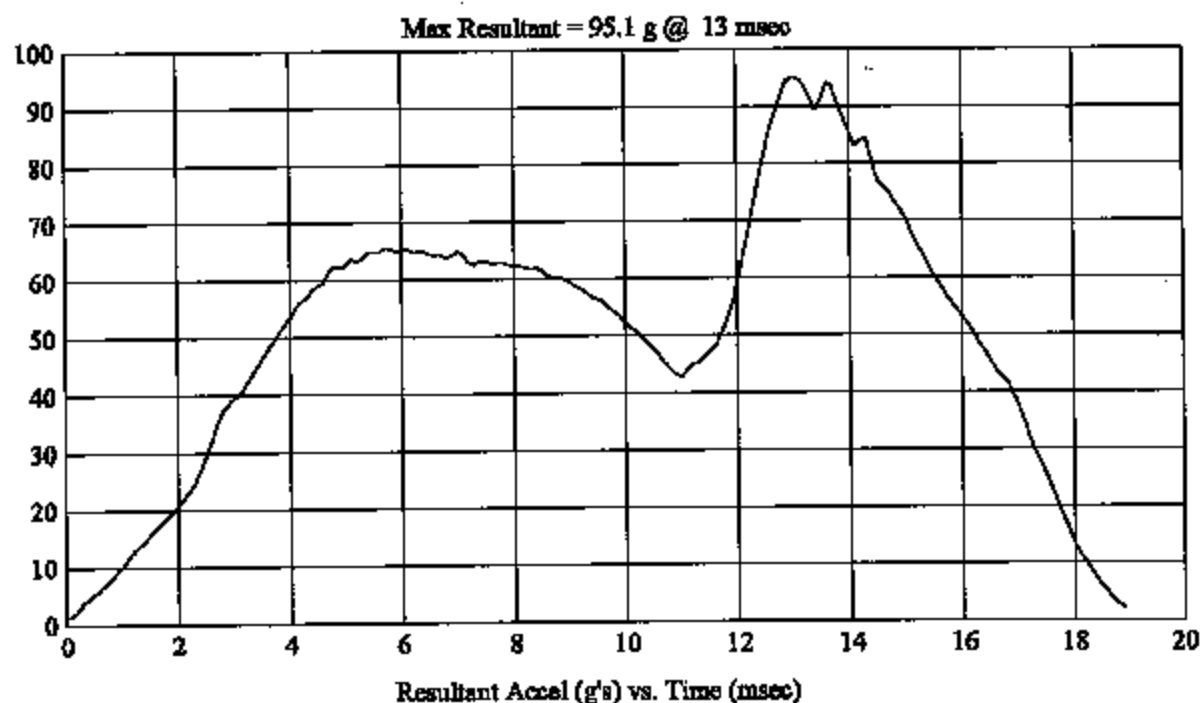
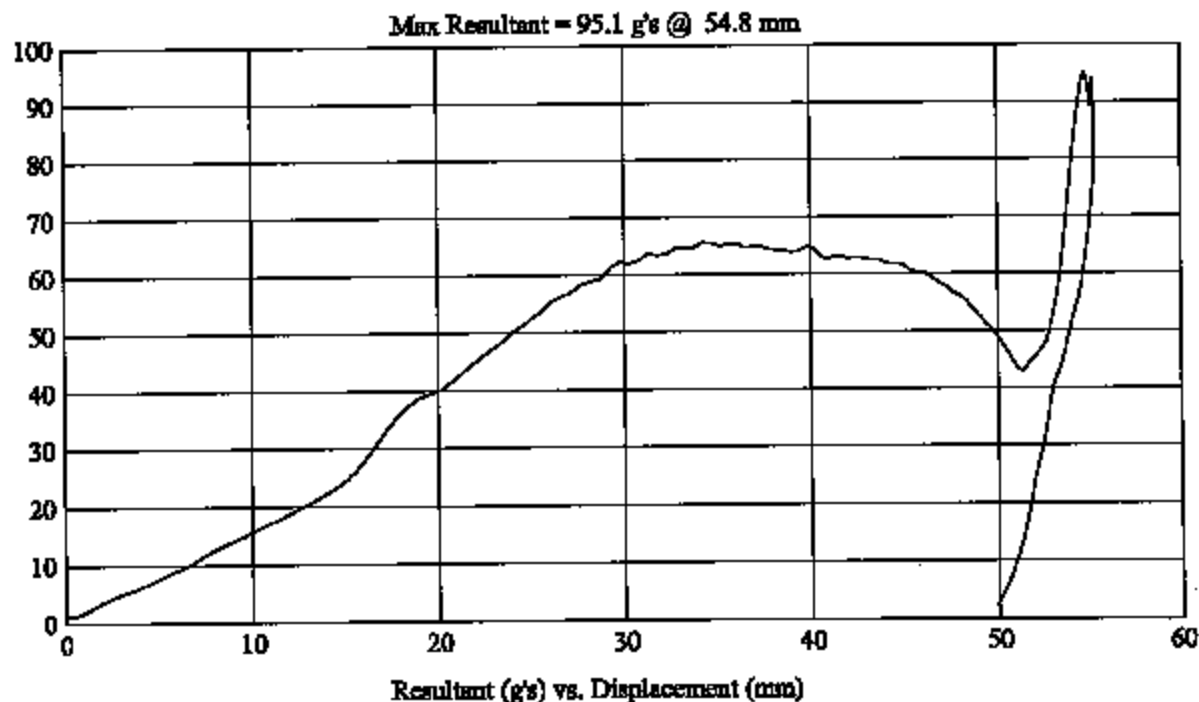
FMH
G05T7-001.8Customer: NHTSA
Test # 6
FM5156
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: FH1
Vehicle Side: Right
Horz/Vert Angle: 180/50

HIC(d) = 486, HIC = 423, Delta T = 14.2 msec



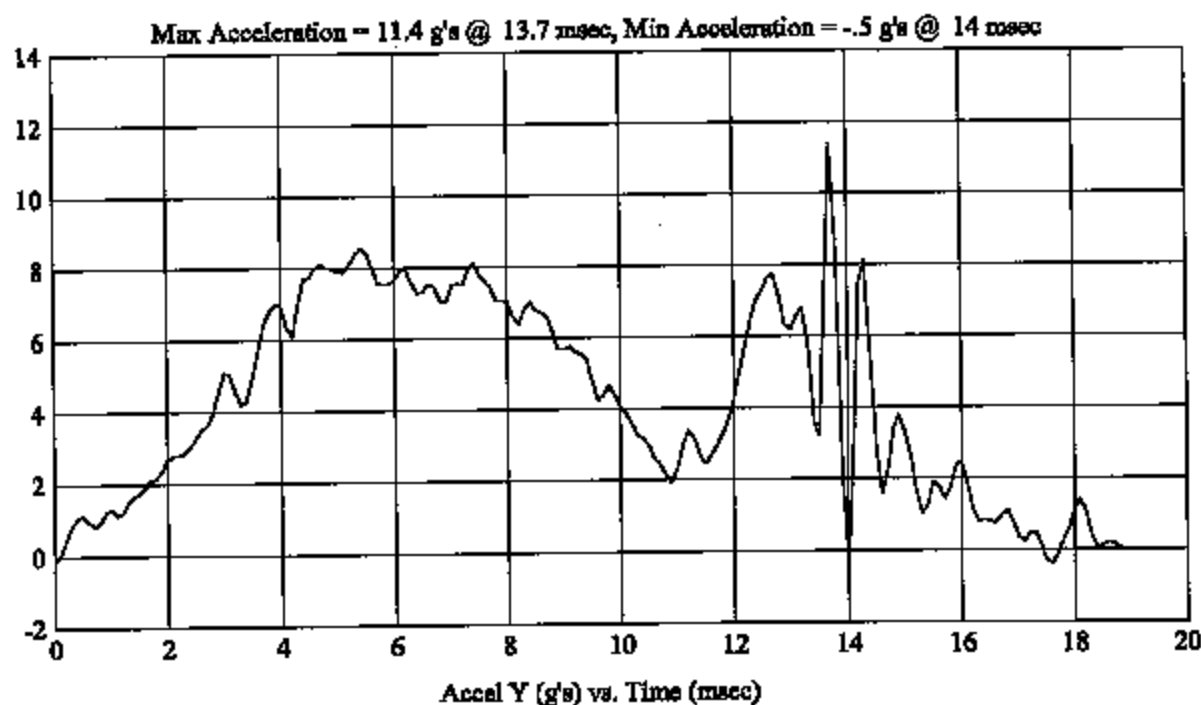
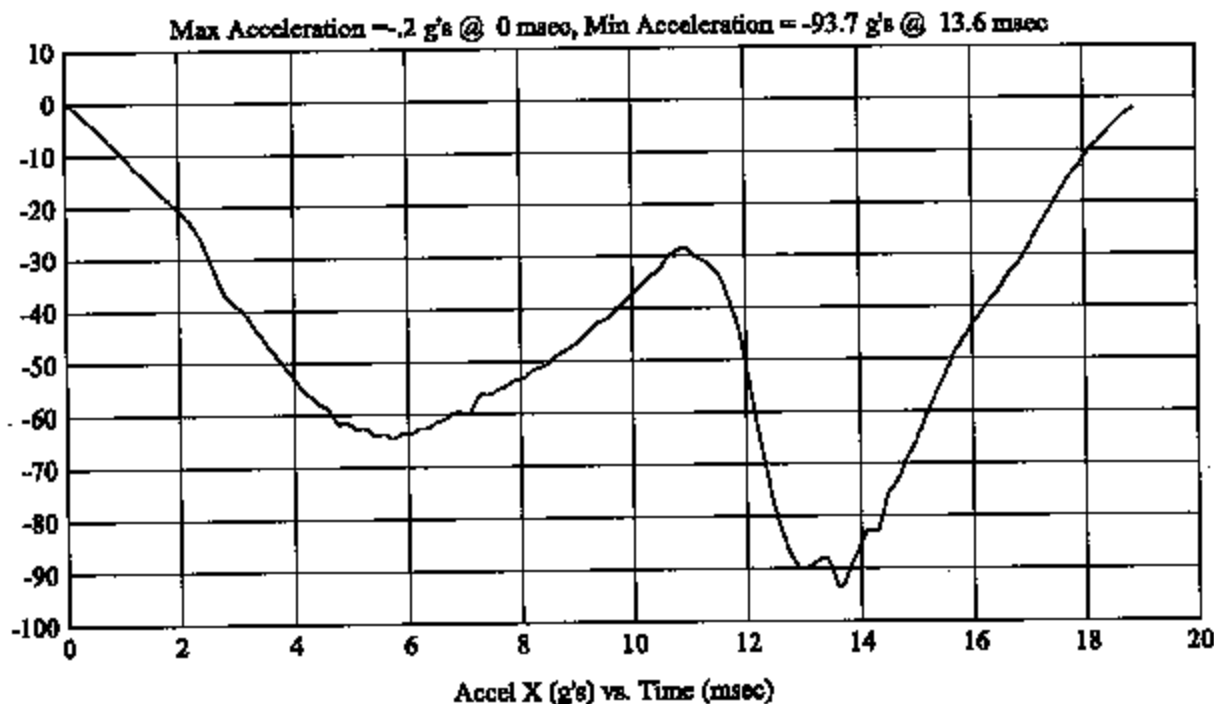
FMH
G0517-001.8Customer: NHTSA
Test # 6
FM5156
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: FH1
Vehicle Side: Right
Horz/Vert Angle: 180/50

HIC(d) = 486, HIC = 423, Delta T = 14.2 msec



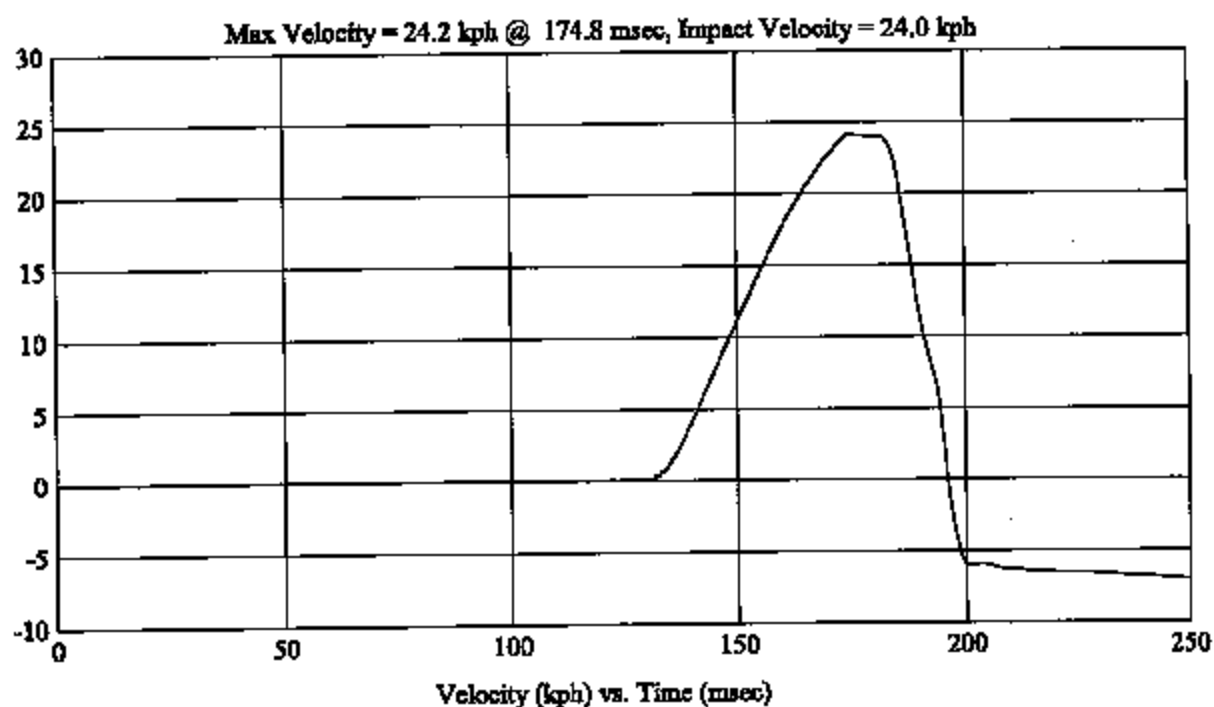
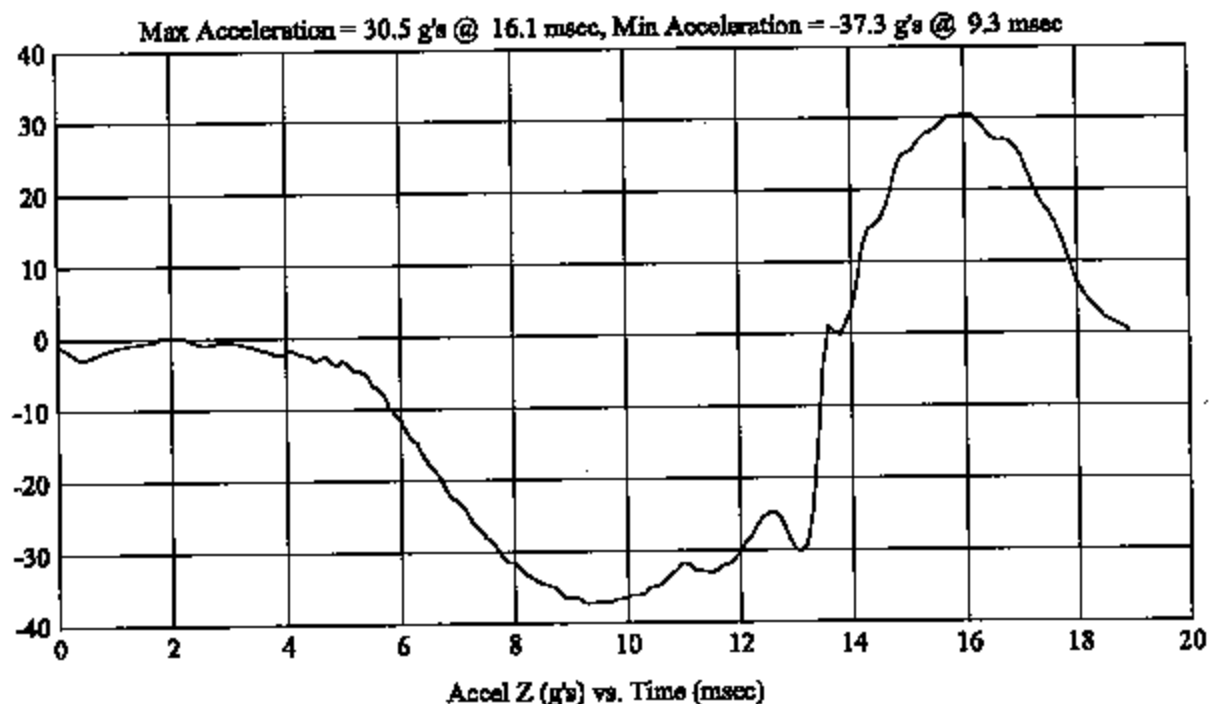
FMH
G0517-001.8Customer: NHTSA
Test # 6
FM5156
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: FH1
Vehicle Side: Right
Horz/Vert Angle: 180/50

HIC(d) = 486, HIC = 423, Delta T = 14.2 msec



FMH
G05Y7-001.8

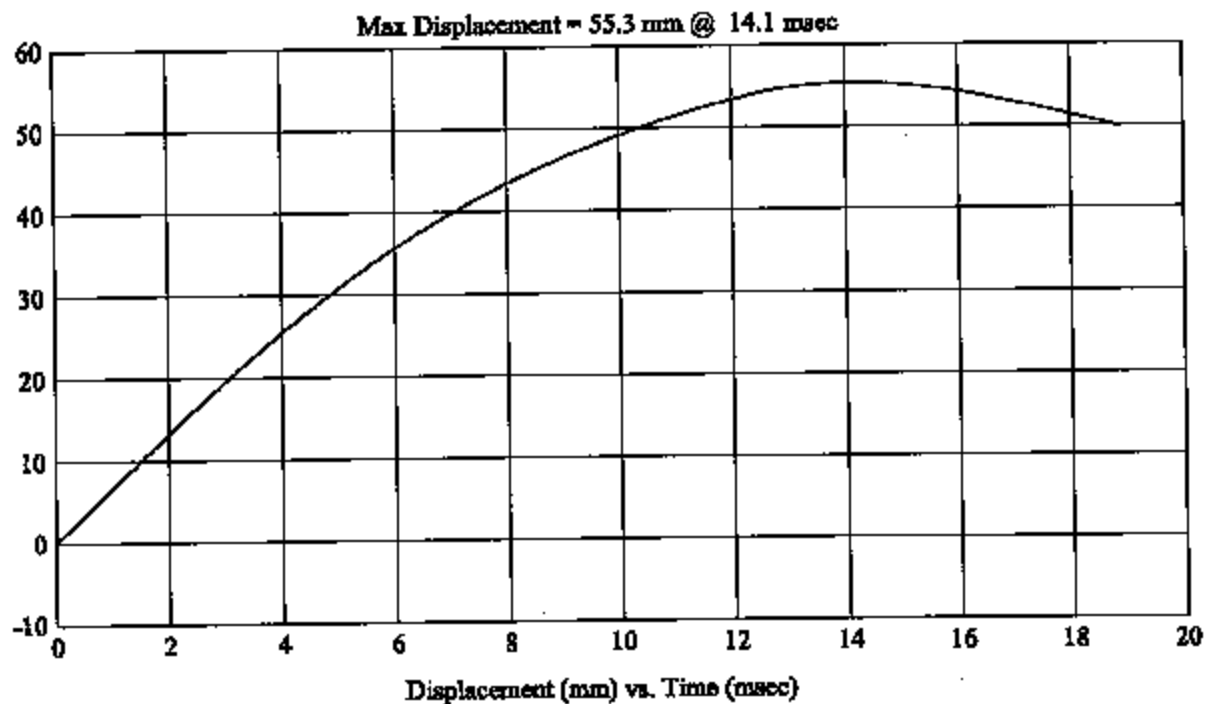
Customer: NHTSA
Test # 6
FM5156
Additional Desc: N/A

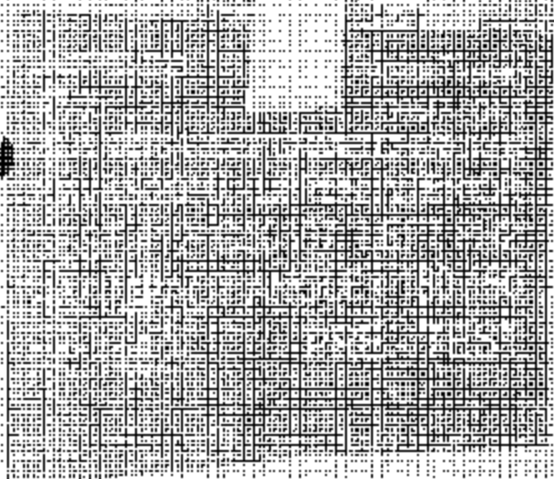
Vehicle Program : Jeep Grand Cherokee

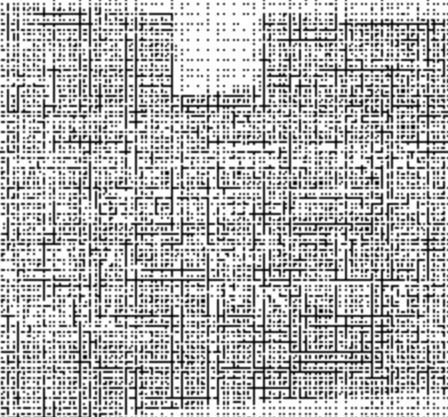
Test Date: 4/6/05

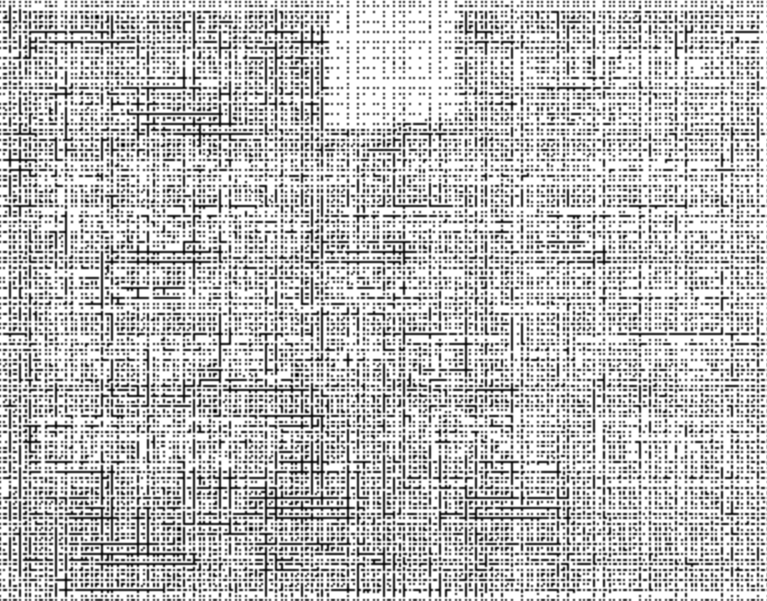
Model Year: 2005
Target: FH1
Vehicle Side: Right
Horz/Vert Angle: 180/50

HIC(d) = 486, HIC = 423, Delta T = 14.2 msec









MICHIGAN OPERATIONS
DATE: 2/8/01
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SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.6 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#12

Target (Vehicle Side): FH2 Left

Temperature: 22°C

MGA Test Reference No.:FM5162

Humidity:37%

Approach Horizontal Angles:180°

Time of Test: 5:00PM

Approach Vertical Angles:50°

FMH Serial No:037

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
420	337	9.6	23.4	26	3 L

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-88.4	1.44	1.44
Y	6	J35841	92.6	1.54	1.54
Z	7	J35791	88.8	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Cracked windshield

Recorded By: Approved By: Date: 4/7/05

*Only necessary for NHTSA (Government) Compliance testing.

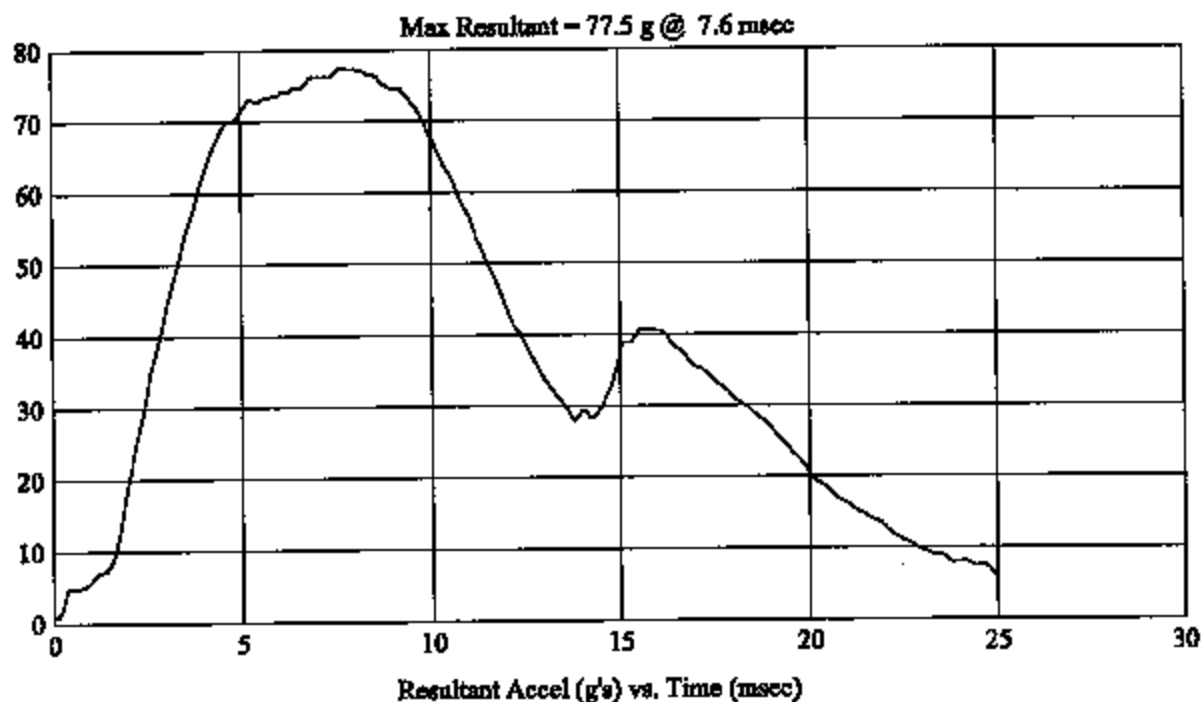
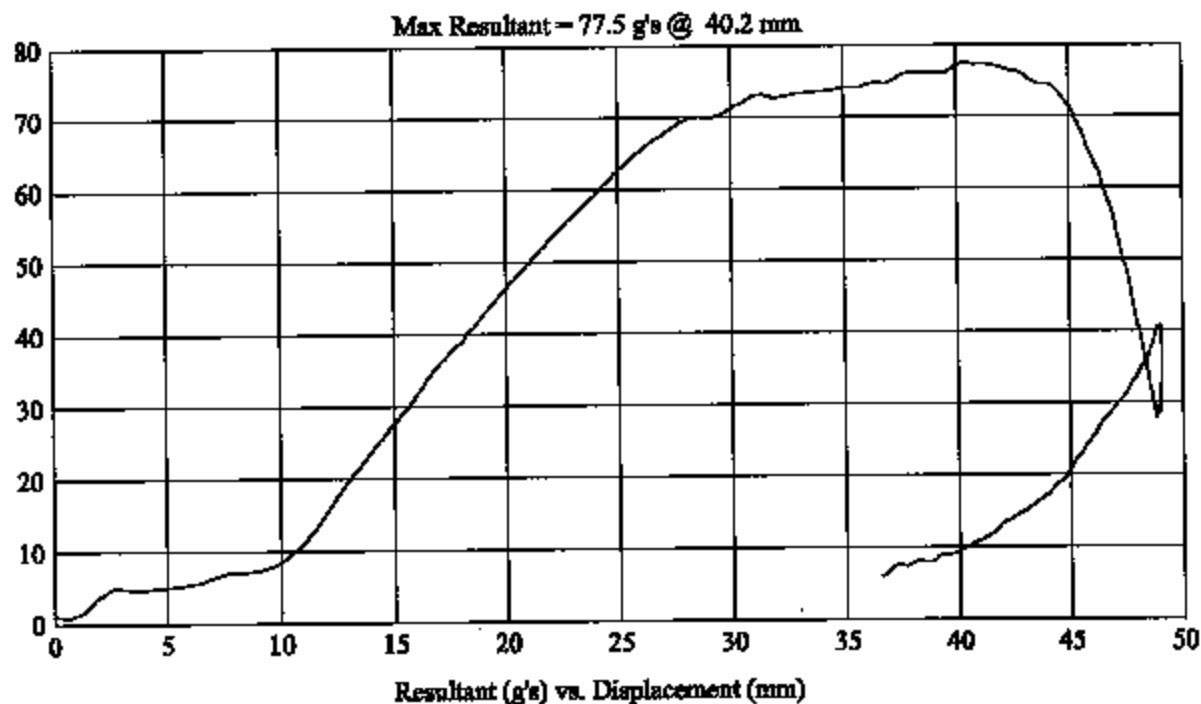
FMH
G0517-001.8Customer: NHTSA
Test # 12
FM5162
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: FH2
Vehicle Side: Left
Horz/Vert Angle: 180/50

HIC(d) = 420, HIC = 337, Delta T = 9.6 msec



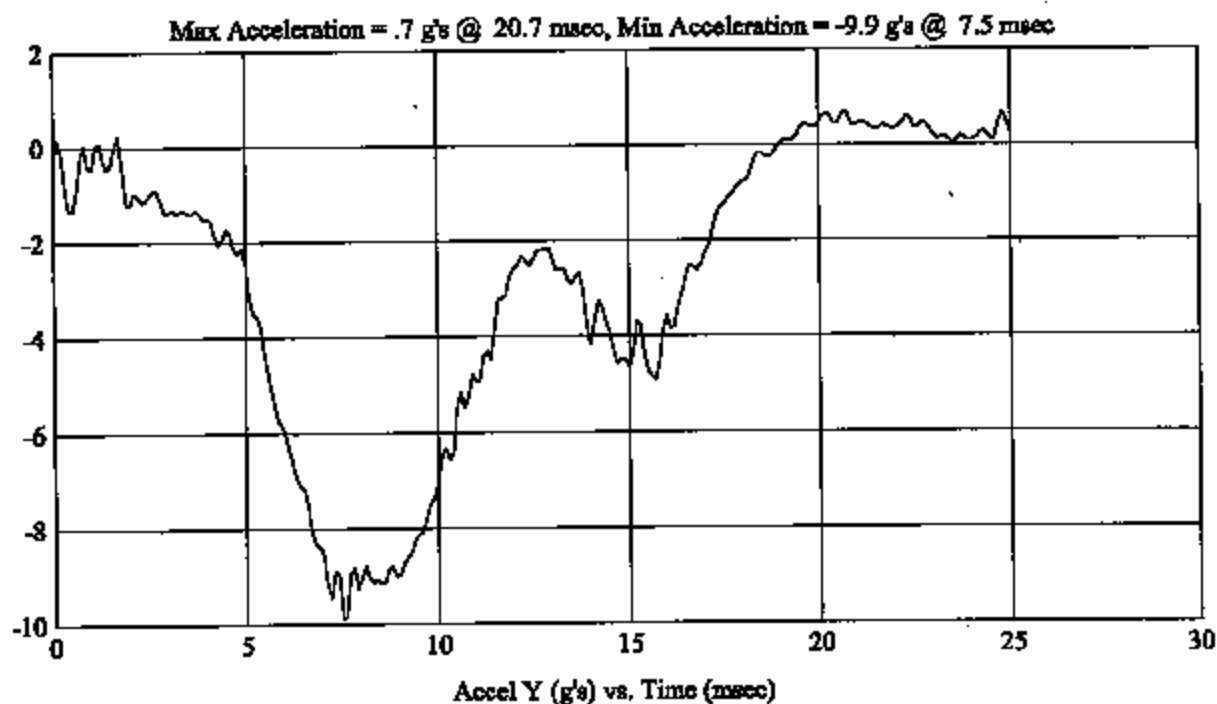
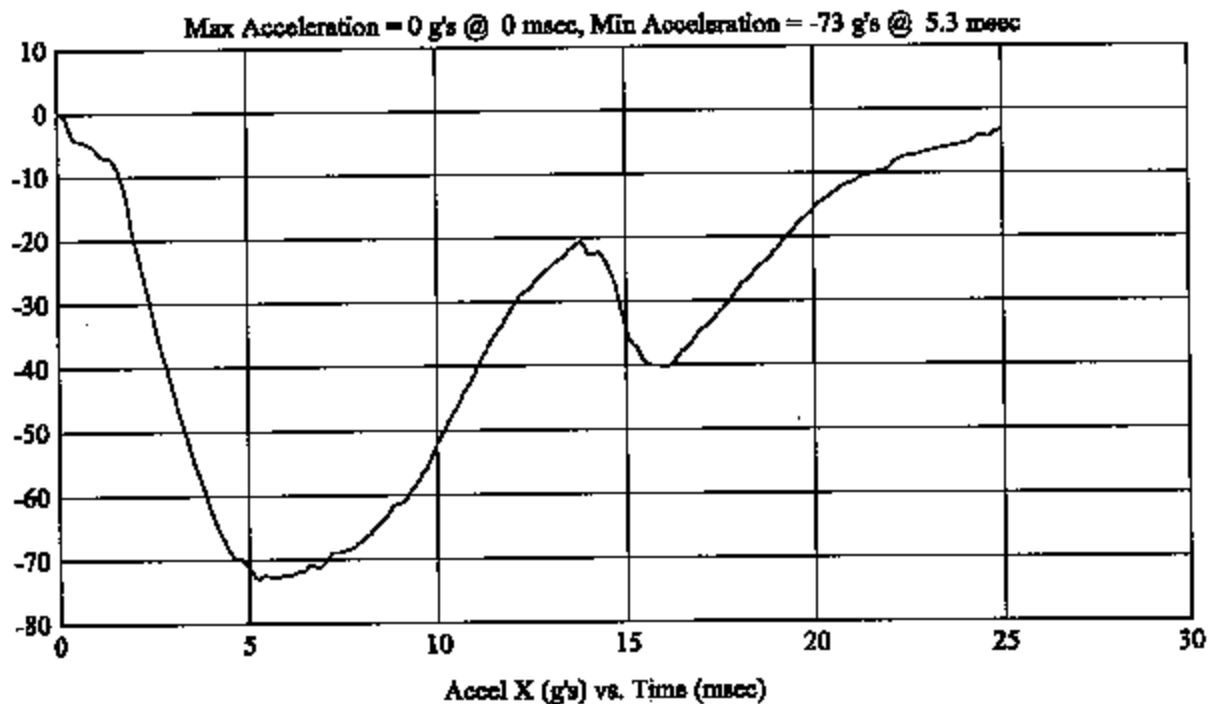
FMH
G0517-001.8Customer: NHTSA
Test # 12
FM5162
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: FH2
Vehicle Side: Left
Horz/Vert Angle: 180/50

HIC(d) = 420, HIC = 337, Delta T = 9.6 msec



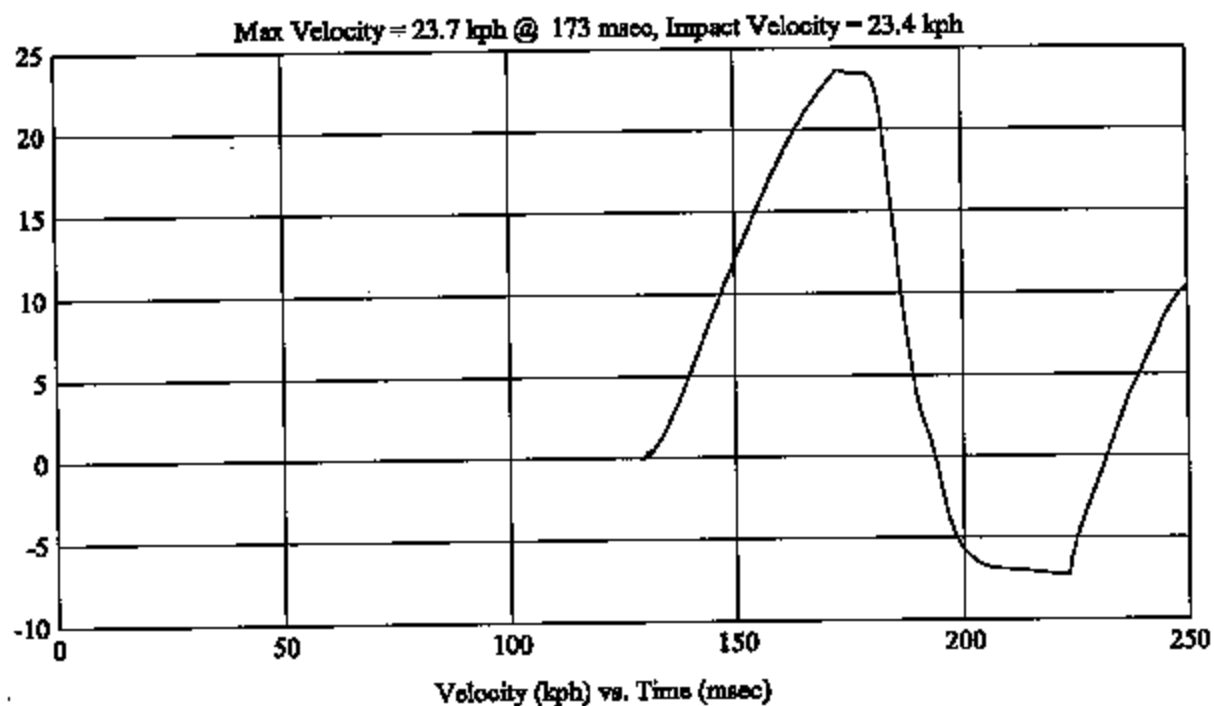
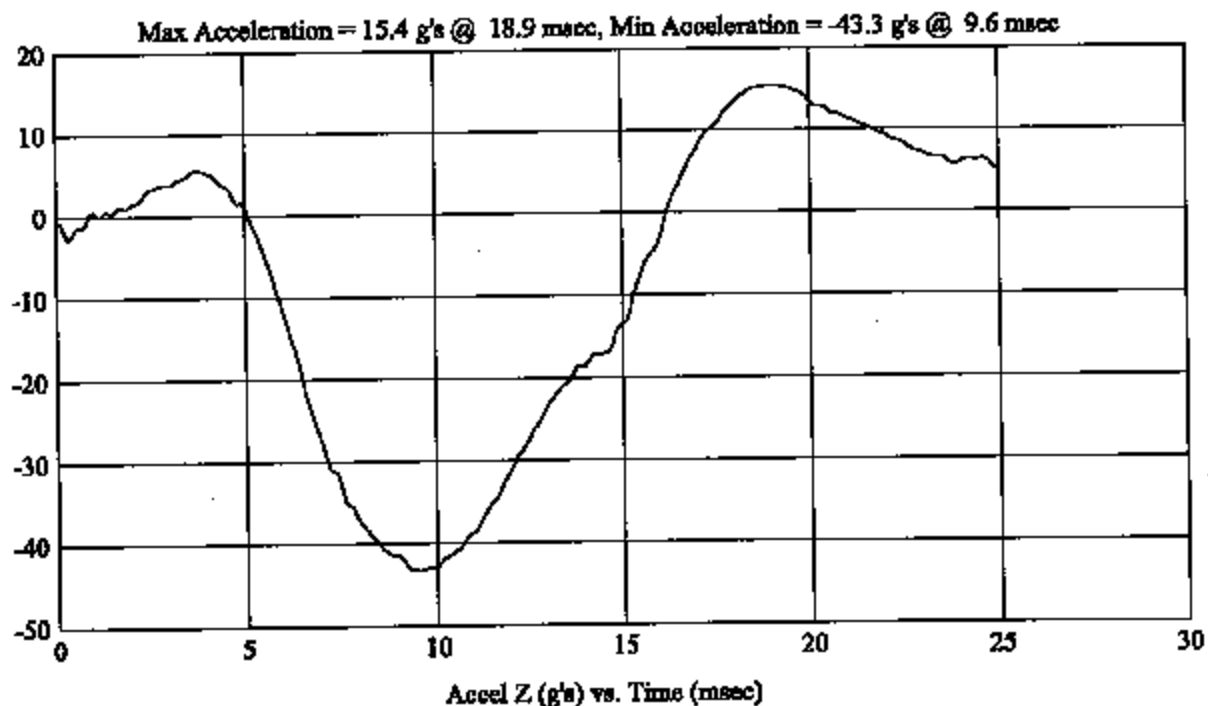
FMH
G0517-001.8Customer: NHTSA
Test # 12
FM5162
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: FH2
Vehicle Side: Left
Horz/Vert Angle: 180/50

HIC(d) = 420, HIC = 337, Delta T = 9.6 msec



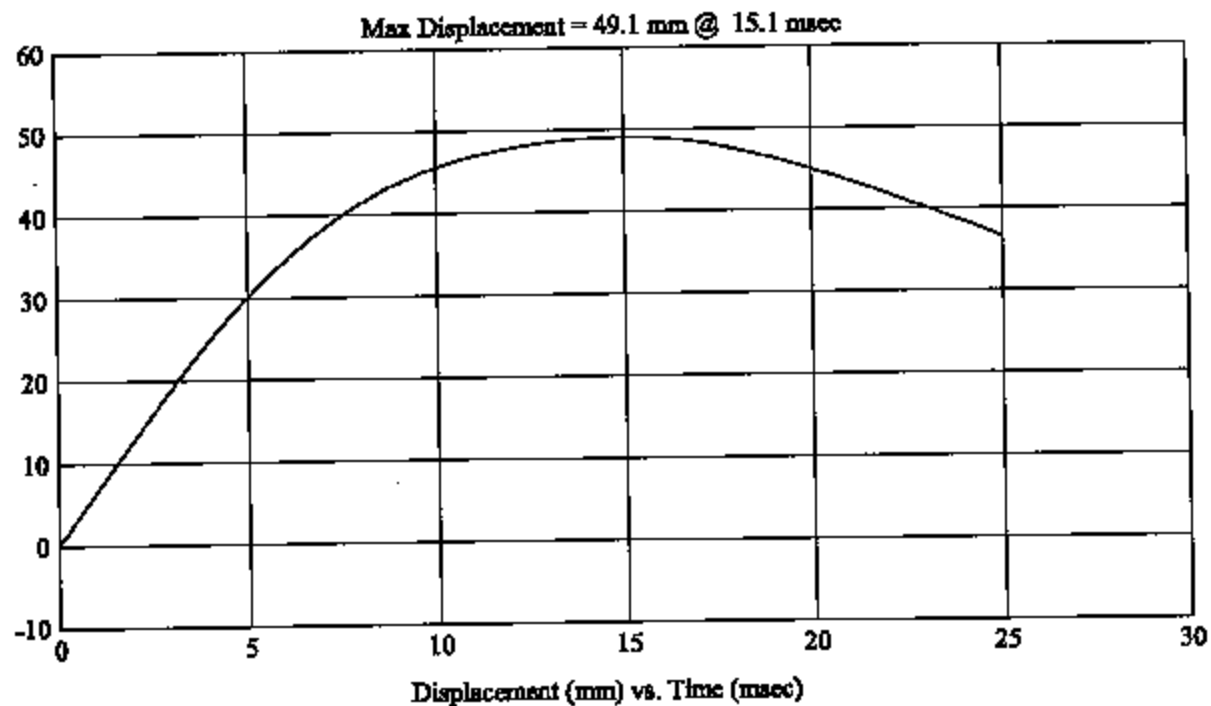
FMH
G0517-001.8Customer: NHTSA
Test # 12
FM5162
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: FH2
Vehicle Side: Left
Horz/Vert Angle: 180/50

HIC(d) = 420, HIC = 337, Delta T = 9.6 msec



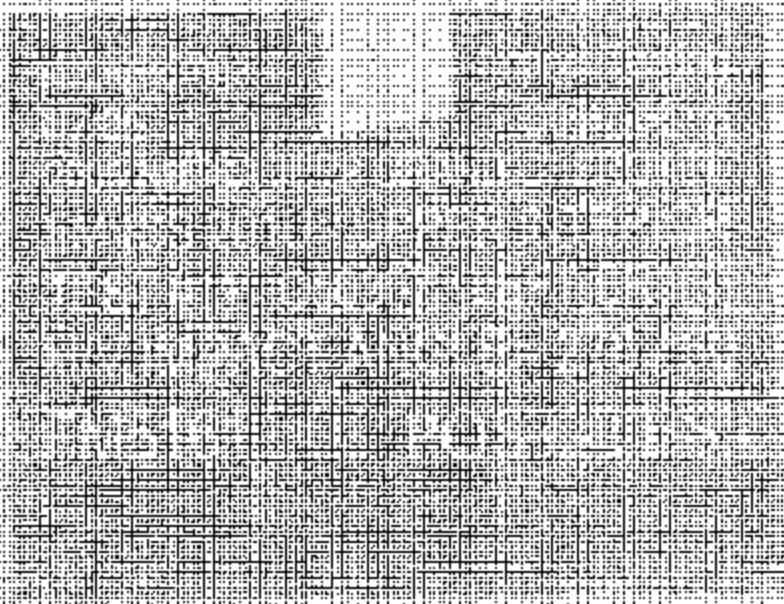
NHTSA 100-100000

100-100000

NHTSA 100-100000

100-100000

2005 NHTSA JEEP GRAND CHEROKEE
FMVSS 2010 - UPPER INTERIOR
TEST #11 CS0307 LEFT SR0303
MV IMPACT ANGLE = 270 / 50
FMV 101 POST-TEST



MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

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SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SR3(3) Left

MGA Test Reference No.:FM5161

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Additional Description:

Test Number:#11

Temperature:22C

Humidity:37%

Time of Test:3:30 PM

FMH Serial No:035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
749	773	4.8	23.5	10	4 L

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-94.1	1.44	1.44
Y	6	J35919	94.3	1.54	1.54
Z	7	J22664	92.7	1.12	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: [Signature] Approved By: [Signature] Date: 4/7/05

*Only necessary for NHTSA (Government) Compliance testing

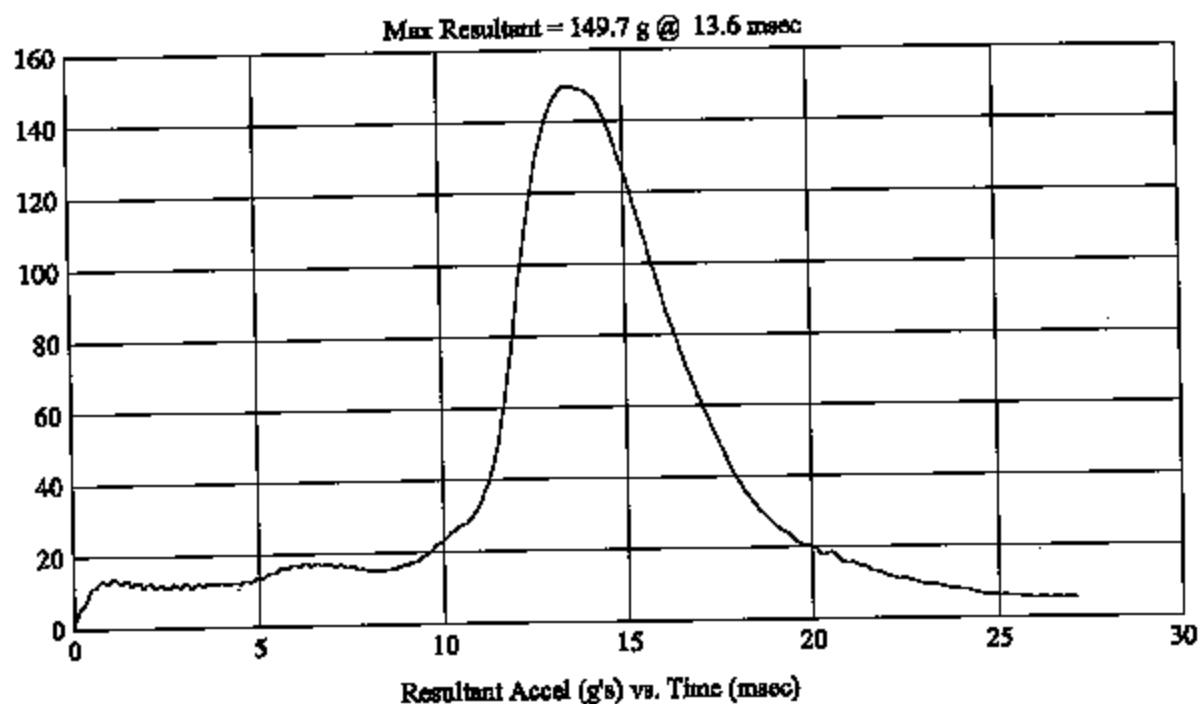
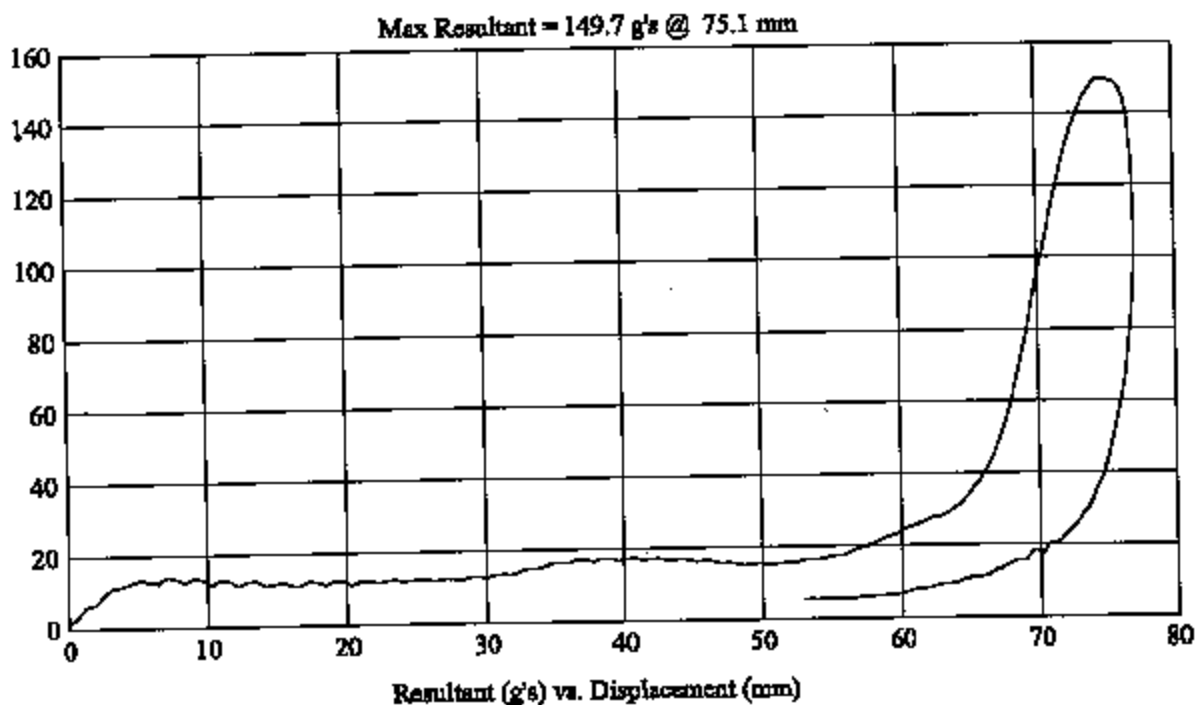
FMH
G0517-001.8Customer: NHTSA
Test # 11
FM5161
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: SR3(3)
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 749, HIC = 773, Delta T = 4.8 msec



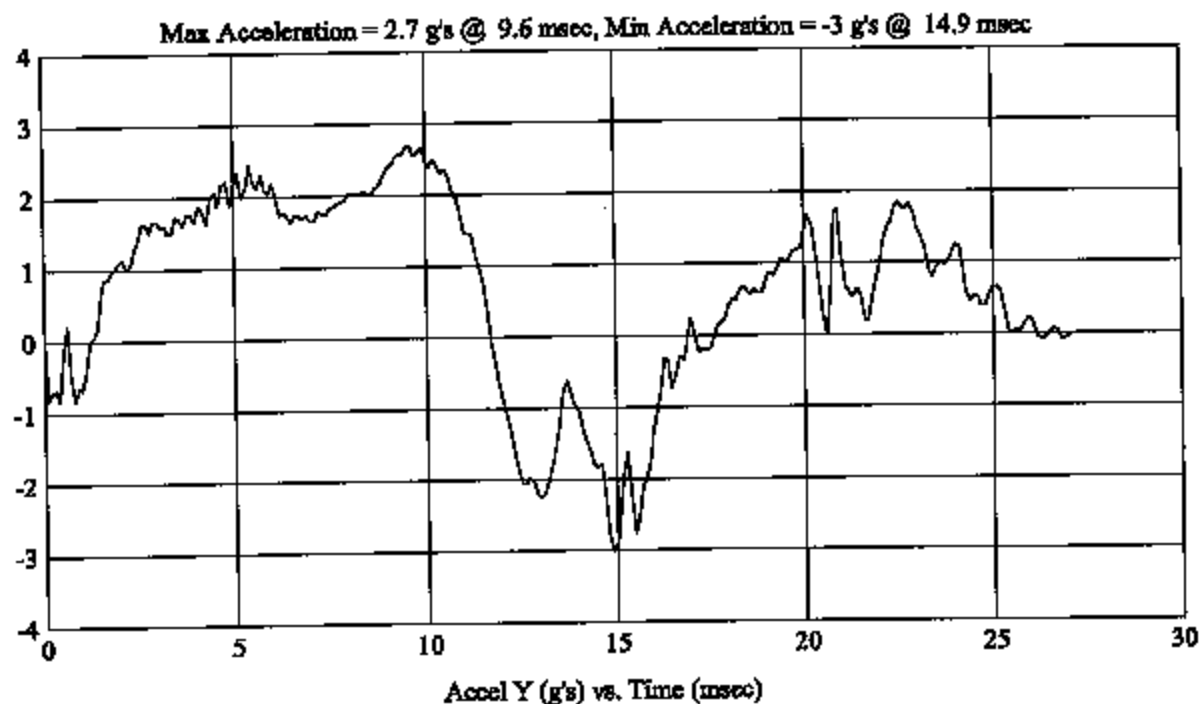
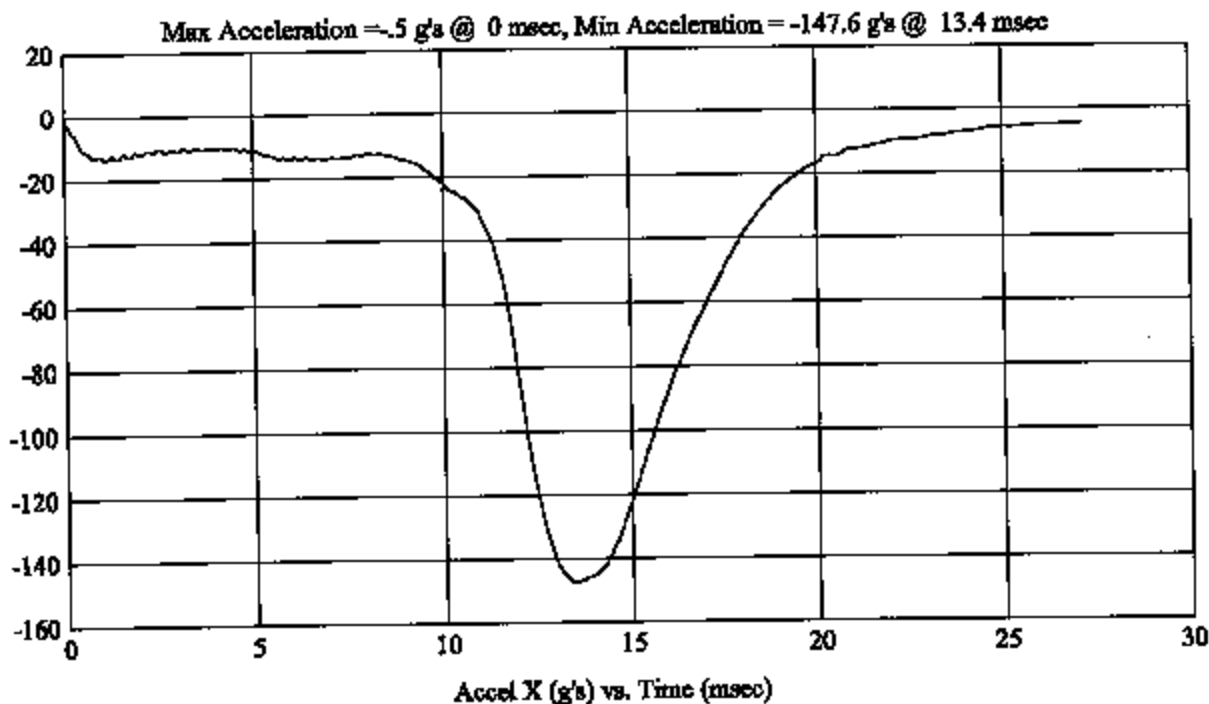
FMH
G0517-001.8Customer: NHTSA
Test # 11
FM5161
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: SR3(3)
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 749, HIC = 773, Delta T = 4.8 msec



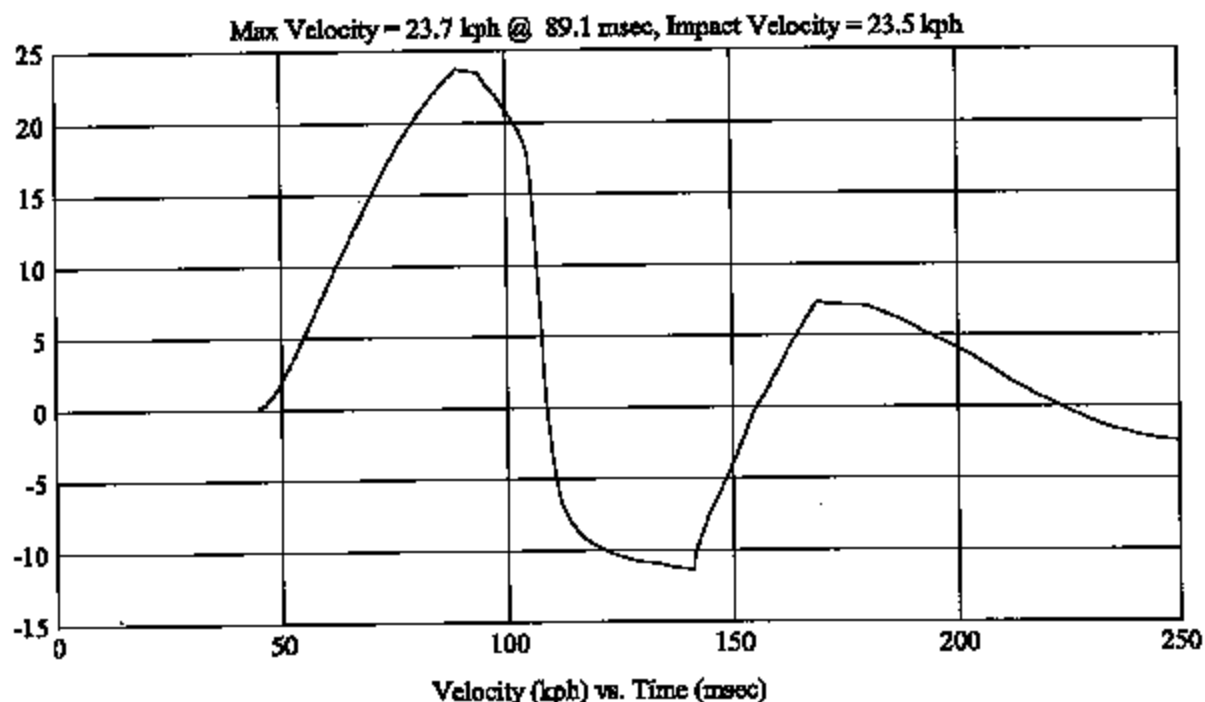
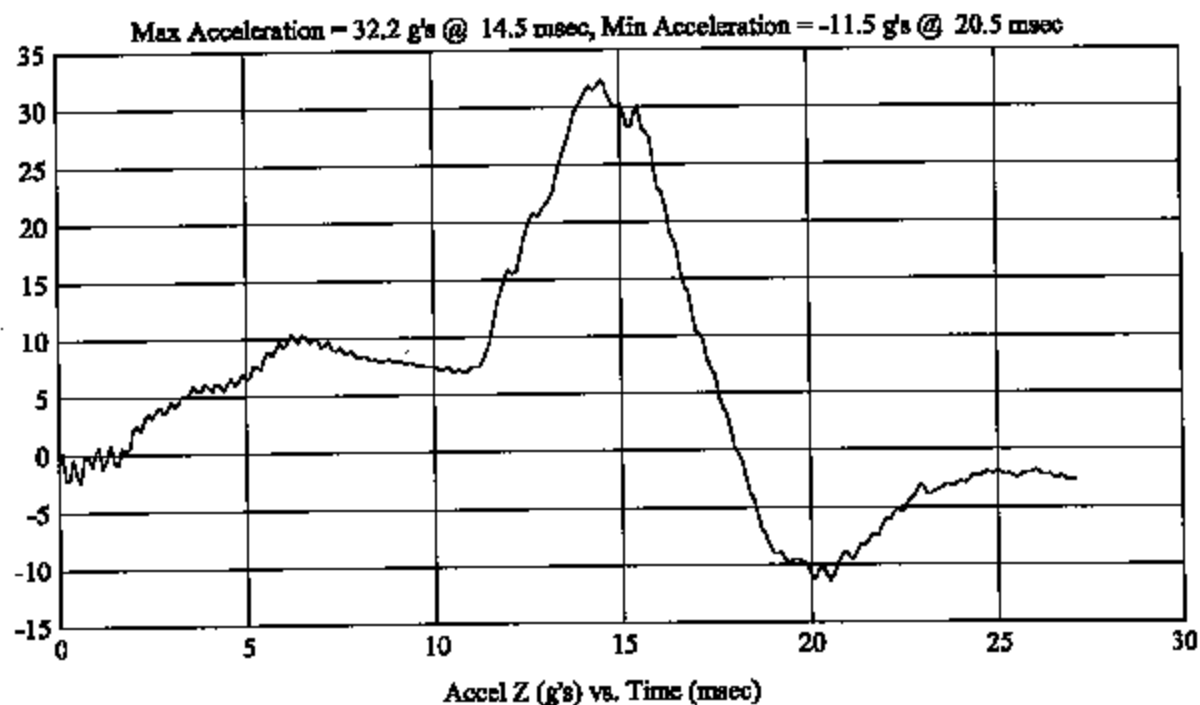
FMH
G0517-001.8Customer: NHTSA
Test # 11
FM5161
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: SR3(3)
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 749, HIC = 773, Delta T = 4.8 msec



FMH
G0517-001.8

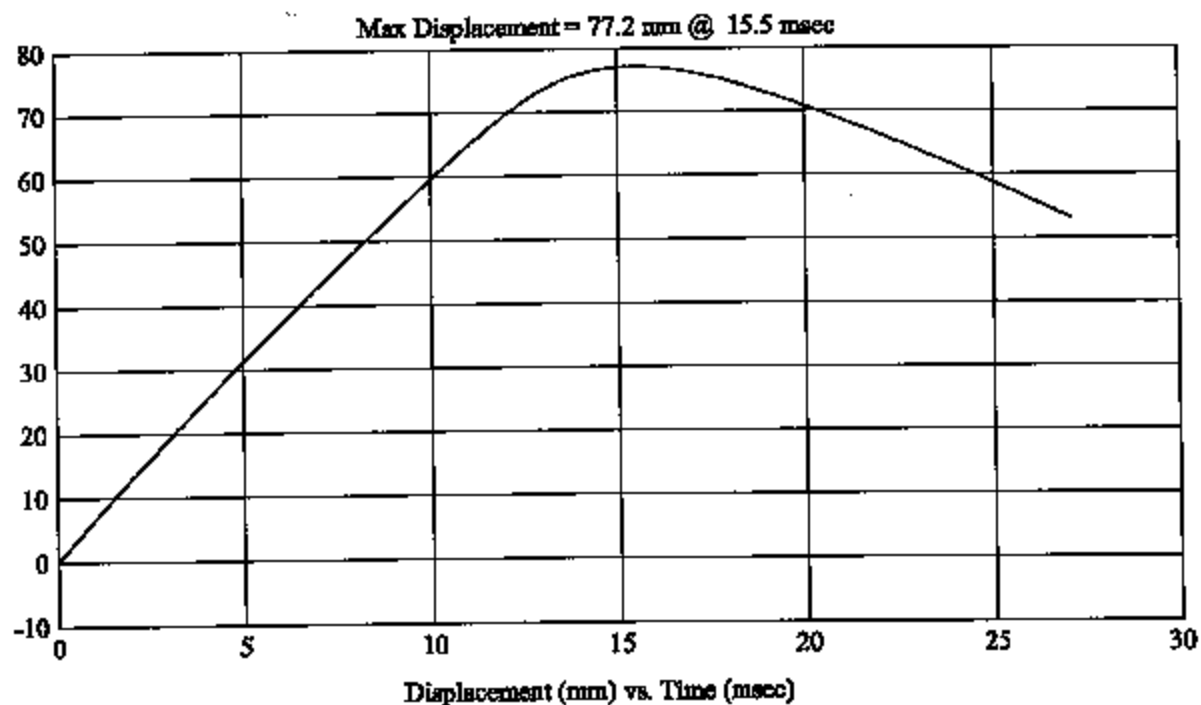
Customer: NETSA
Test # 11
FM5161
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/7/05

Model Year: 2005
Target: SR3(3)
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 749, HIC = 773, Delta T = 4.8 msec



Impact Angle

A-505

Impact Testing

C0517-0518

2005 N-TSA JEEP GRAND CHEROKEE

FMVSS 2010 - UPPER INTERIOR

TEST #8 C50307 LEFT UR1

HV IMPACT ANGLE = 270 / 50

FMVSS PRE - TEST

NHTSA

44045

Impact Testing

G0517-001.6

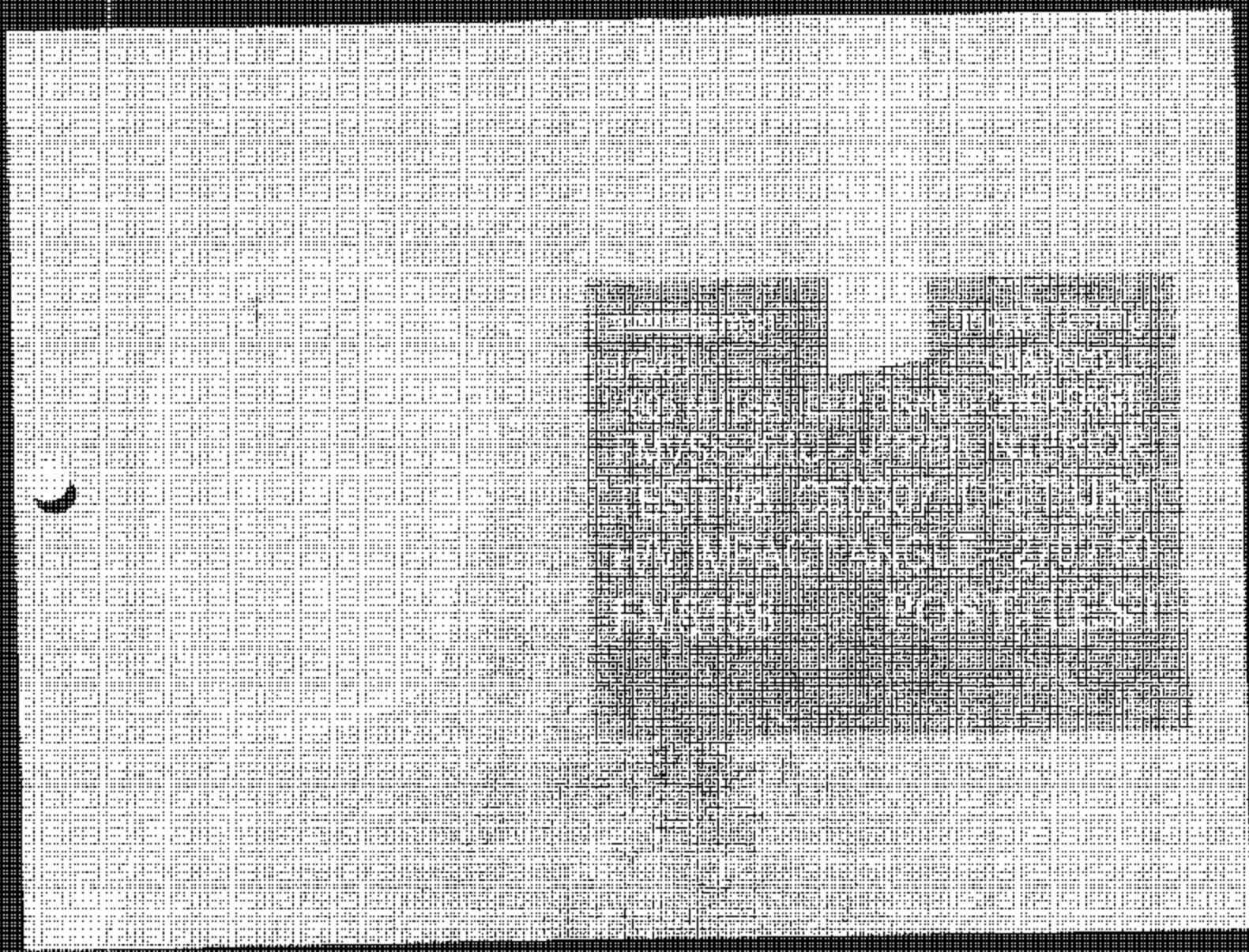
2005 NHTSA JEEP GRAND CHEROKEE

FMVSS 2010 - UPPER INTERIOR

TEST #5 C50307 LEFT UR1

HAY IMPACT ANGLE = 270 / 50

FMVSS 2010 POST-TEST



MICHIGAN OPERATIONS
DATE: 2/1/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL: 2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR1 Left

MGA Test Reference No.: FM5158

Approach Horizontal Angles: 270°

Approach Vertical Angles: 50°

Additional Description:

Test Number: #8

Temperature: 22°C

Humidity: 44%

Time of Test: 3:00 PM

FMH Serial No: 037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
492	431	10.1	23.4	35	12 R

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-98.4	1.44	1.44
Y	6	J35841	92.6	1.54	1.54
Z	7	J35791	88.8	1.13	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Headliner deformation

Recorded By: [Signature] Approved By: [Signature] Date: 4/6/05

*Only necessary for NHTSA (Government) Compliance testing.

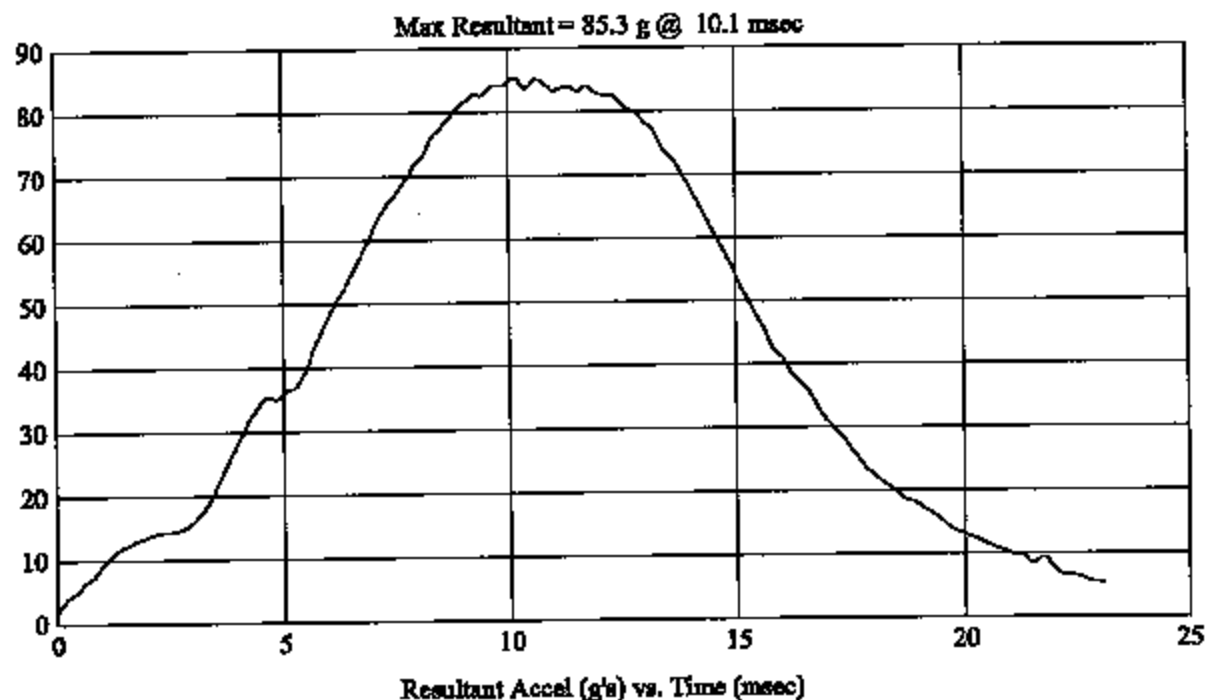
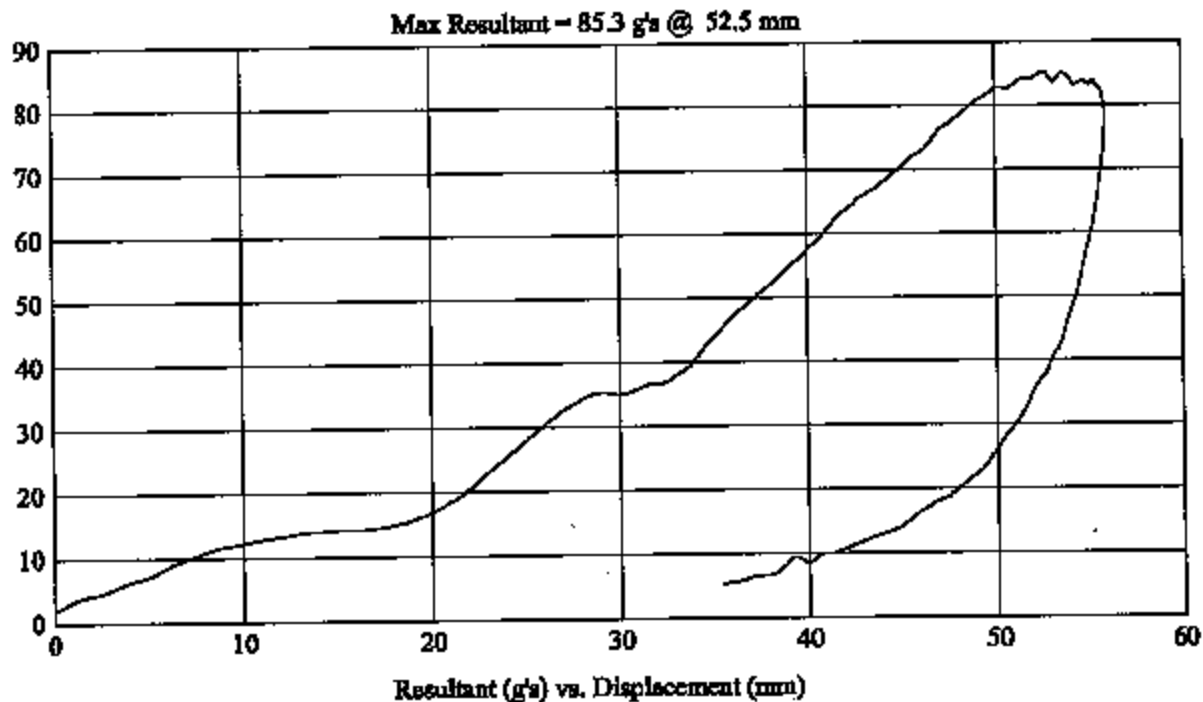
FMH
G0517-001.8Customer: NHTSA
Test # 8
FM5158
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR1
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 492, HIC = 431, Delta T = 10.1 msec



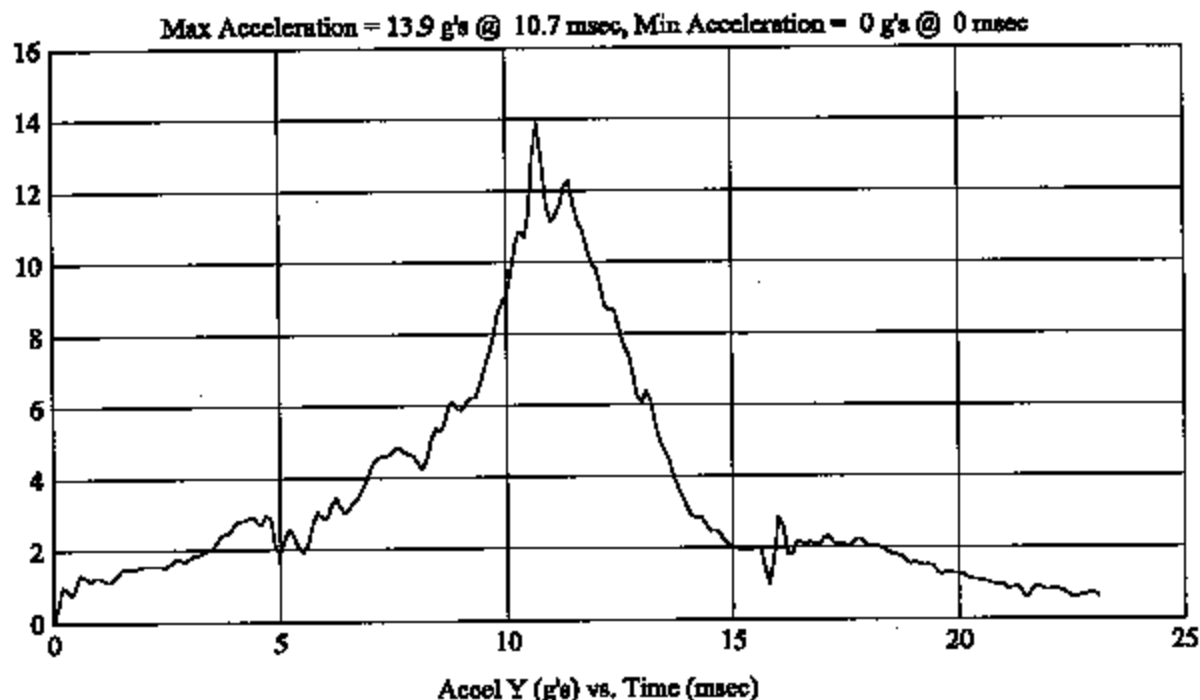
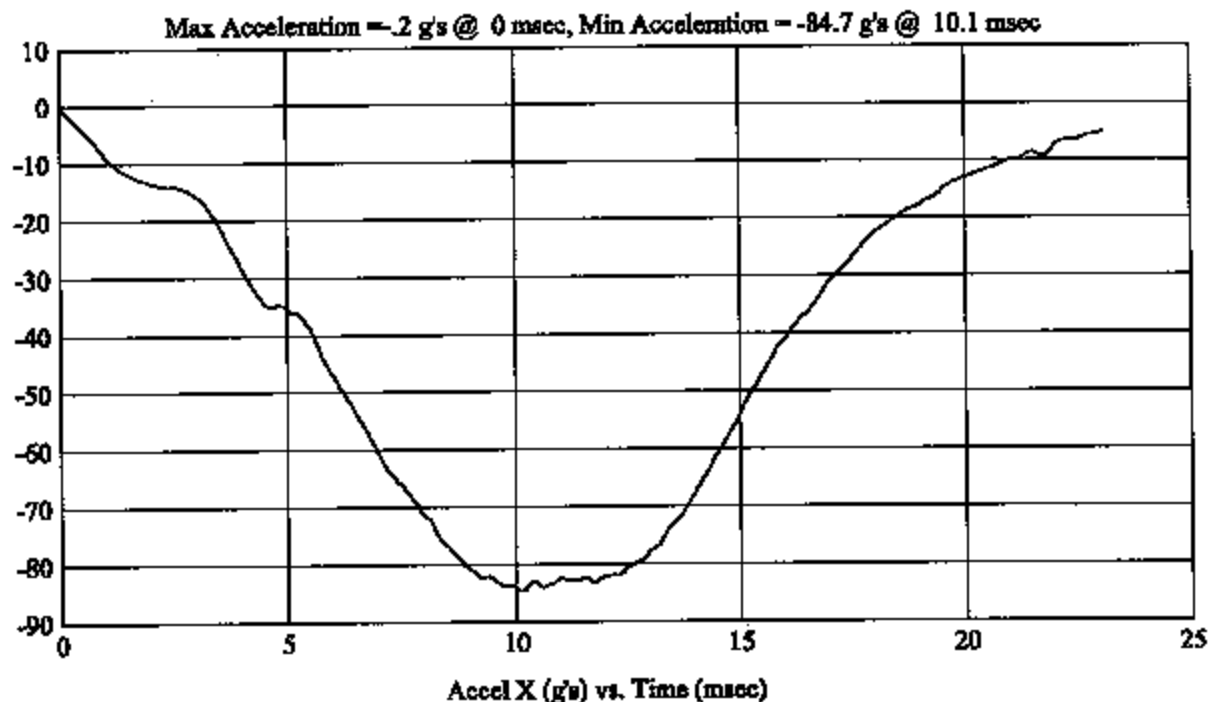
FMH
G0517-001.8Customer: NHTSA
Test # 8
FM5158
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR1
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 492, HIC = 431, Delta T = 10.1 msec



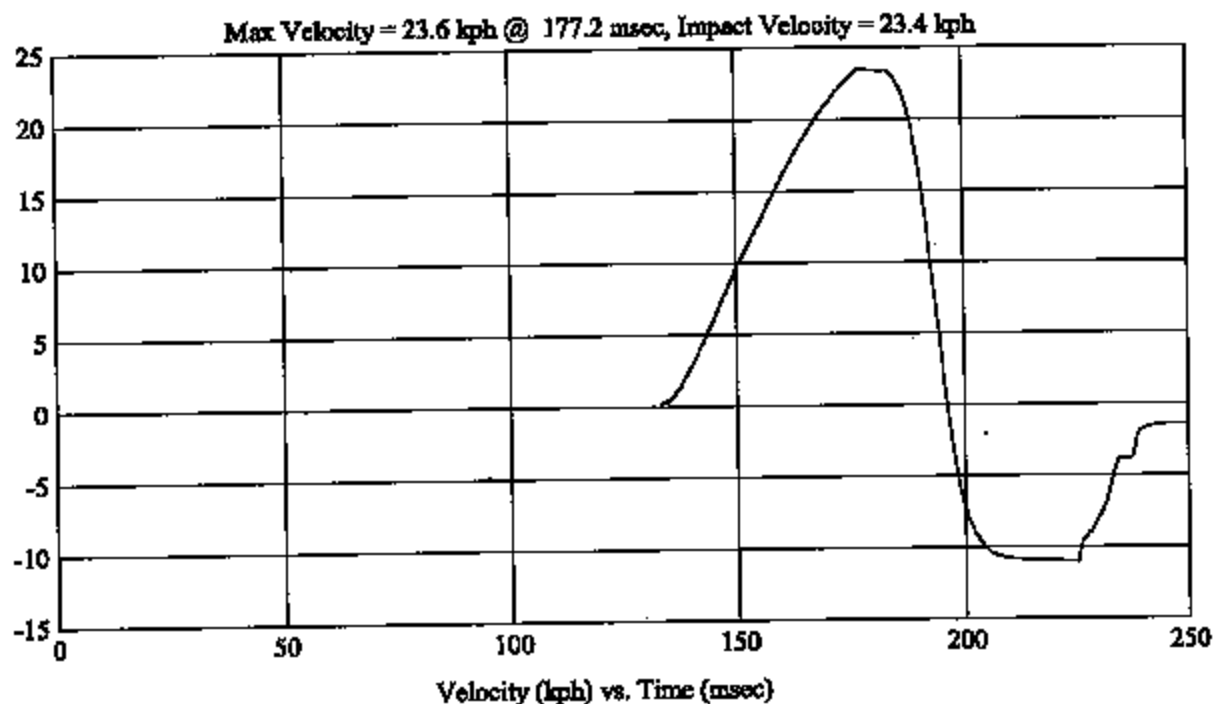
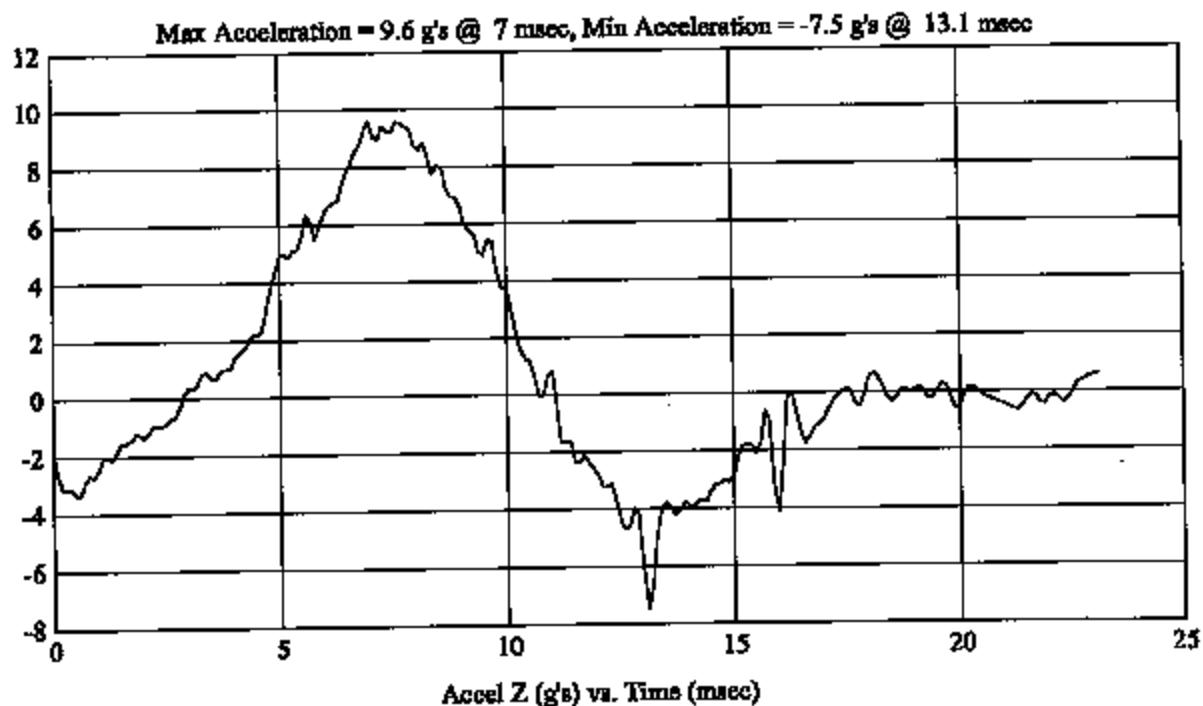
FMH
G0517-001.8Customer: NHTSA
Test # 8
FM5158
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR1
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 492, HIC = 431, Delta T = 10.1 msec



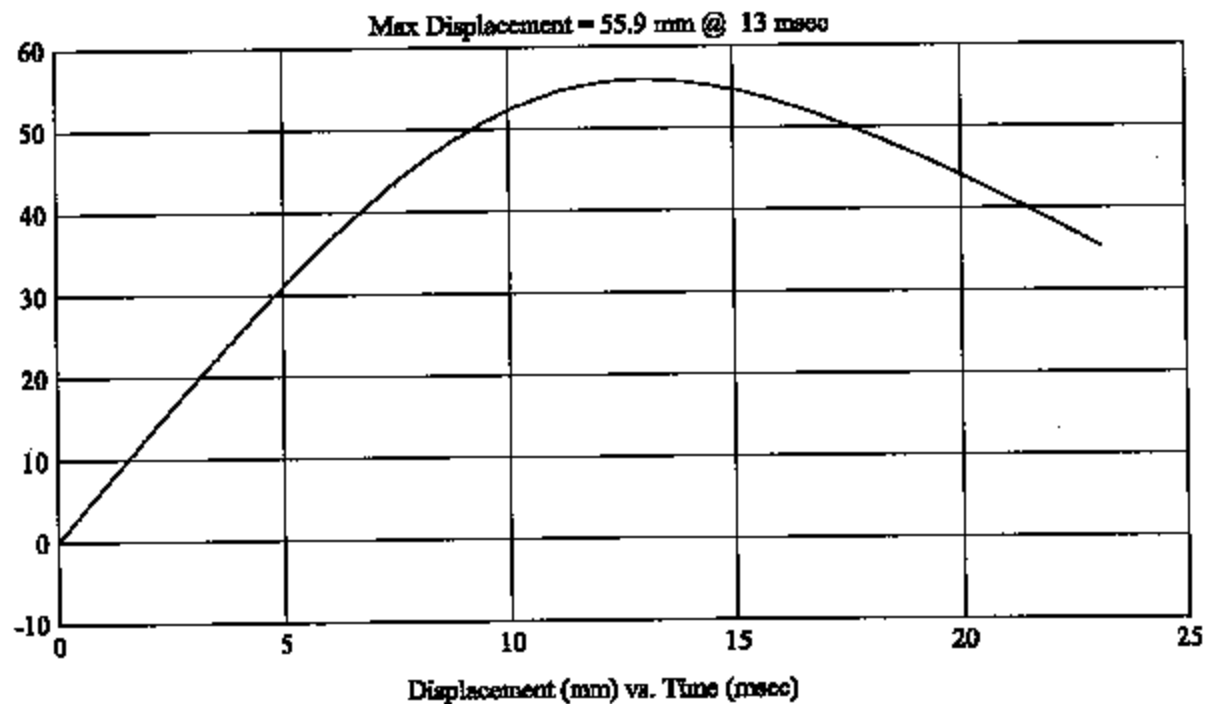
FMH
G05I7-001.8Customer: NHTSA
Test # 8
FM5158
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR1
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 492, HIC = 431, Delta T = 10.1 msec



NHTSA Form 10-10

Impact Testing

4-8-05

G257-001.3

2005 NHTSA JEEP GRAND CHEROKEE

FMVSS 2010 - UPPER INTERIOR

TEST #10 C50307 LEFT UR2

HAY IMPACT ANGLE= 270 / 48

FM5160

PRE - TEST

MGA

4605

Impact Testing

GC517-001.8

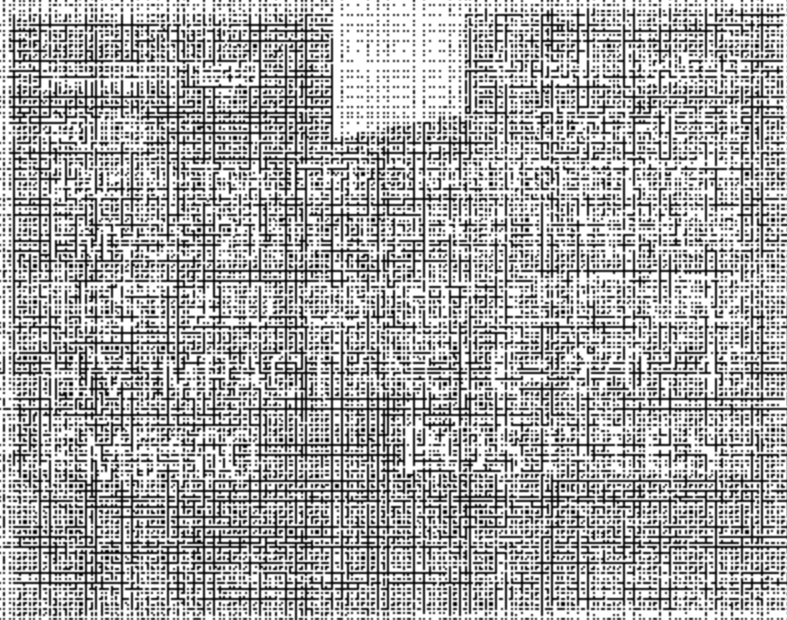
2000 NHTSA JEEP GRAND CHEROKEE

FMVSS 2010 - UPPER INTERIOR

TEST #10 C50307 LEFT UR2

H/V IMPACT ANGLE = 270 / 48

FM5160 POST-TEST



MICHIGAN OPERATIONS
DATE: 2/8/01
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SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL:2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR2 Left

MGA Test Reference No.:FM5160

Approach Horizontal Angles:270°

Approach Vertical Angles:48°

Additional Description:

Test Number:#10

Temperature:22C

Humidity:44%

Time of Test:5:15 PM

FMH Serial No:035

TEST RESULTS:

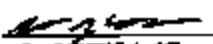
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
474	408	12.2	23.3	30	5 L

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35824	-94.1	1.44	1.44
Y	6	J35819	94.3	1.54	1.54
Z	7	J22664	92.7	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By:  Approved By:  Date: 4/8/05

*Only necessary for NHTSA (Government) Compliance testing.

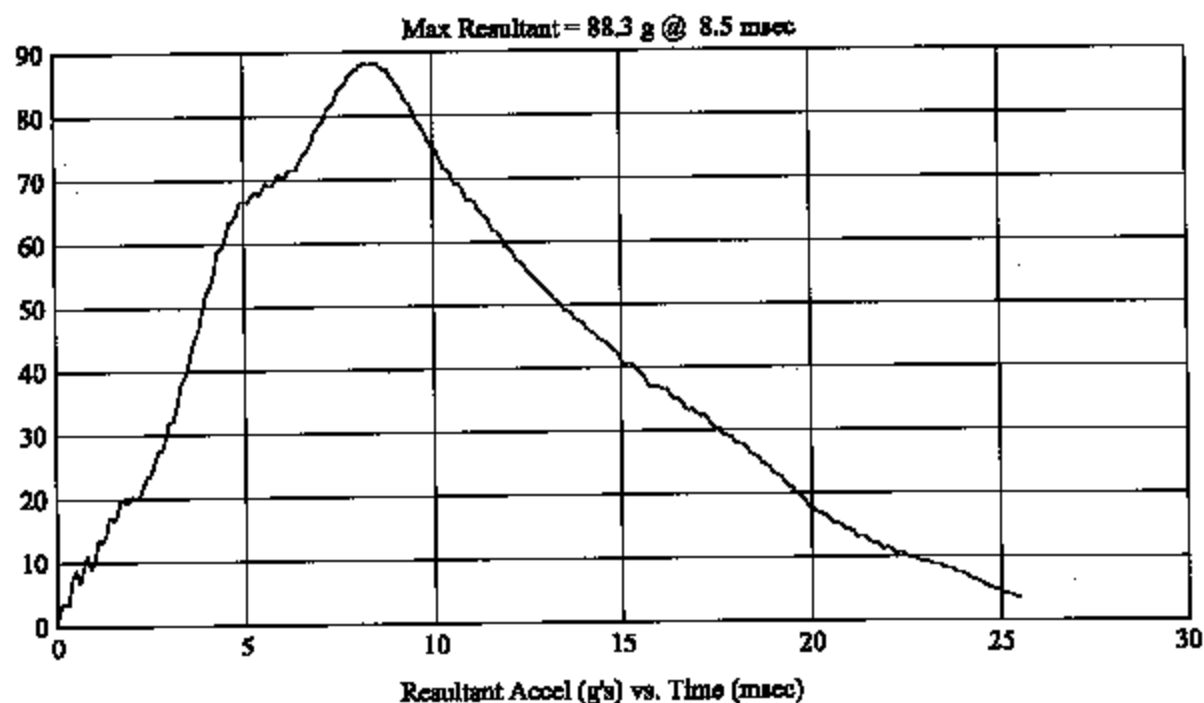
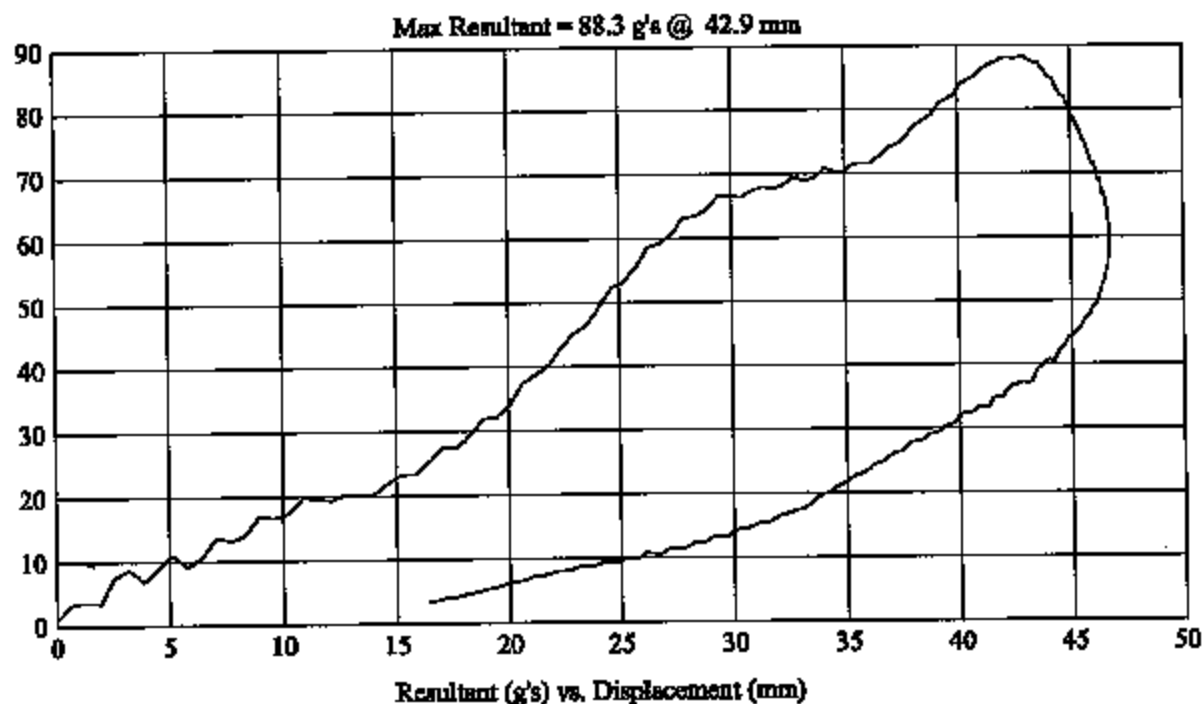
FMH
G0517-001.8Customer: NHTSA
Test # 10
FM5160
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/48

HIC(d) = 474, HIC = 408, Delta T = 12.2 msec



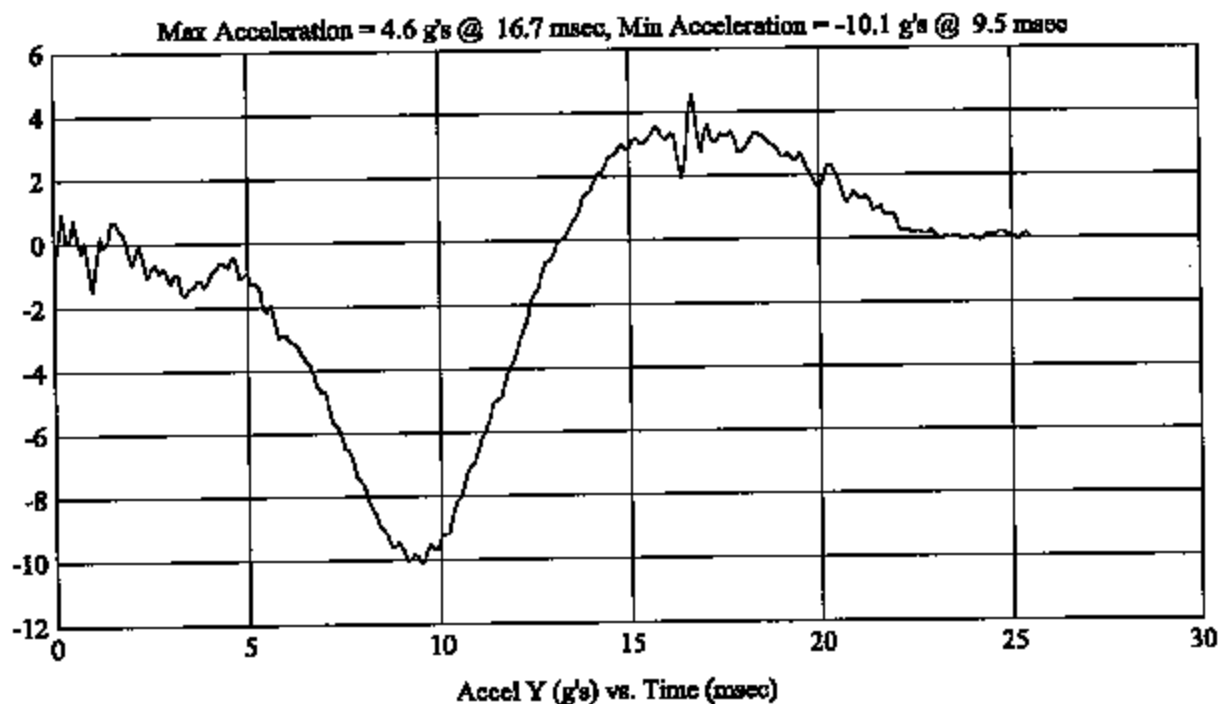
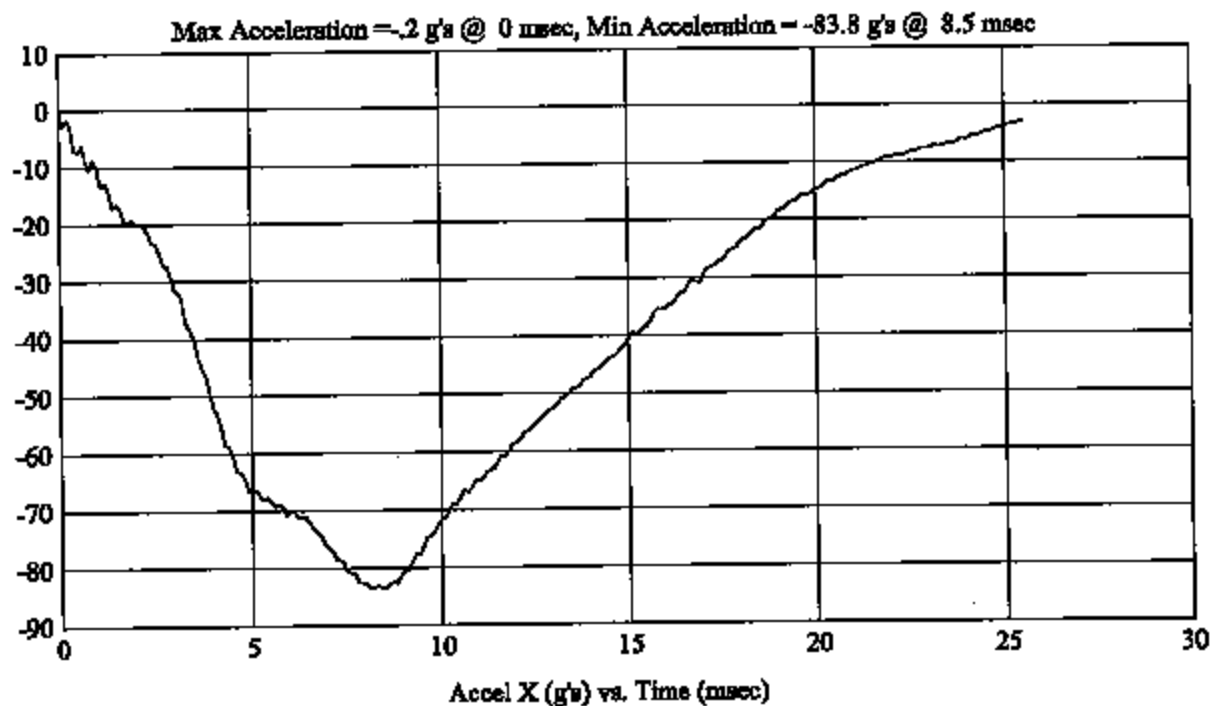
FMH
G0517-001.8Customer: NHTSA
Test # 10
FM5160
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/48

HIC(d) = 474, HIC = 408, Delta T = 12.2 msec



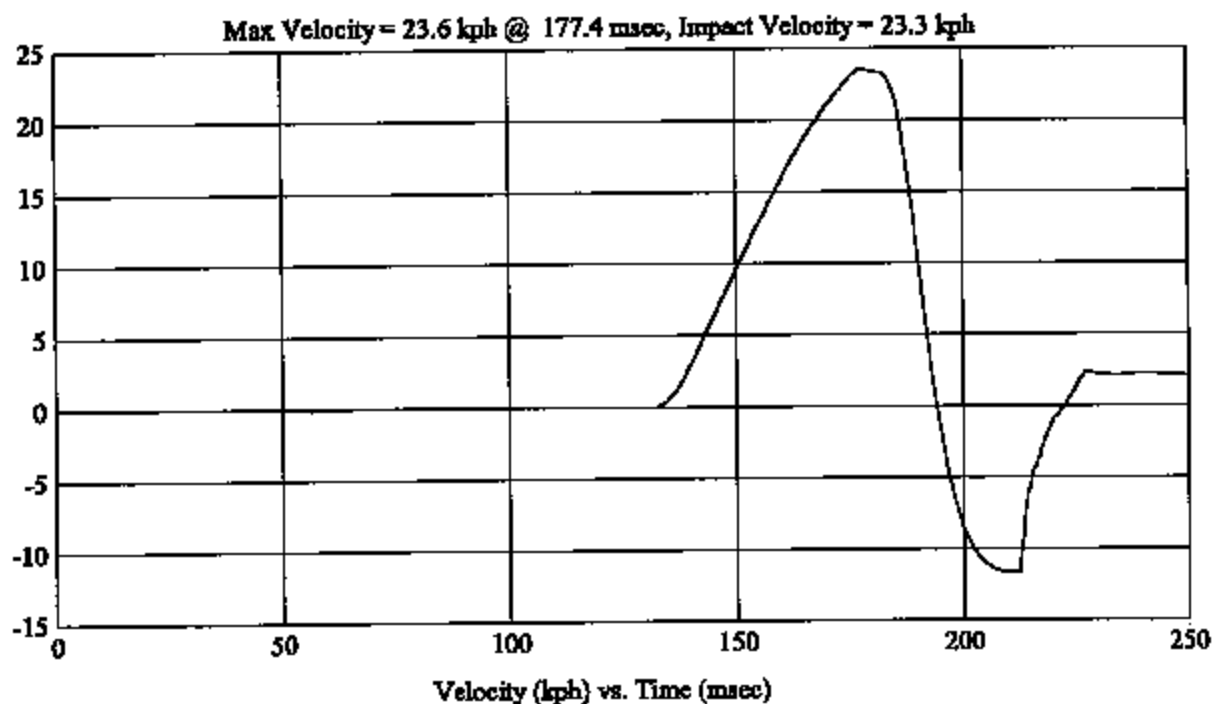
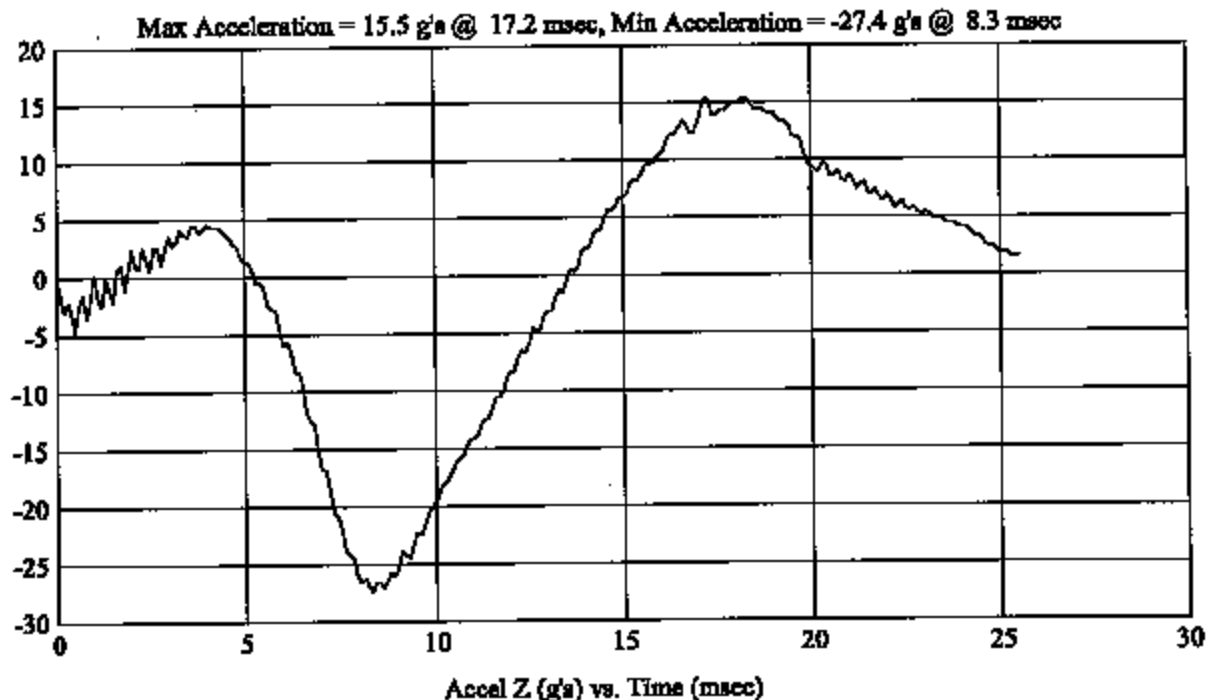
FMH
G05T7-001.8Customer: NHTSA
Test # 10
FM5160
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/48

HIC(d) = 474, HIC = 408, Delta T = 12.2 msec



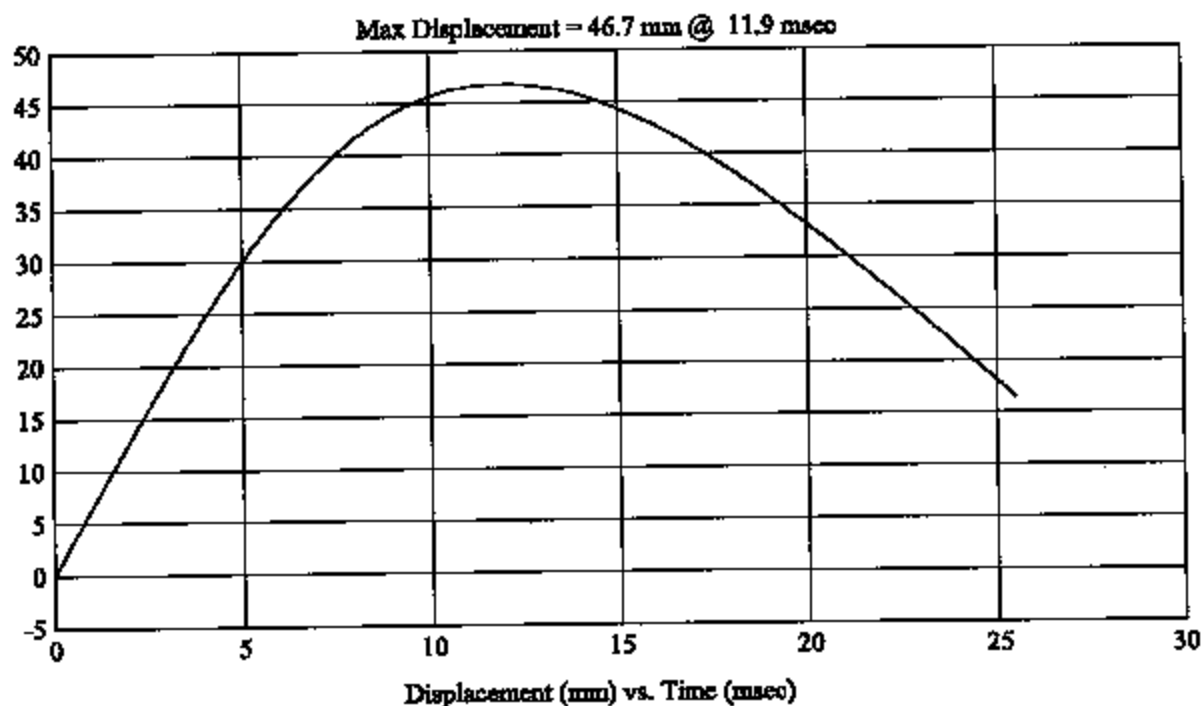
FMH
G05I7-001.8Customer: NHTSA
Test # 10
FM5160
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/48

HIC(d) = 474, HIC = 408, Delta T = 12.2 msec



4/3/05

Impact Testing

4/3/05

G0517-001.8

2005 NHTSA JEEP GRAND CHEROKEE

FMVSS 2010 - UPPER INTERIOR

TEST #5 RIGHT UR6

H/V IMPACT ANGLE = 90 / 41

FM5155

PRE-TEST

4000

Impact Testing

4000

00017-001.2

2005 NHTSA JEEP GRAND CHEROKEE

FMVSS 2010 - UPPER INTERIOR

TEST #5 RIGHT UR6

HV IMPACT ANGLE = 90 / 41

FM5155

POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/1/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
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SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0517-001.8 VEHICLE YR/MAKE/MODEL: 2005/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR6 Right

MGA Test Reference No.: FM5155

Approach Horizontal Angles: 90°

Approach Vertical Angles: 41°

Additional Description:

Test Number: #5

Temperature: 22°C

Humidity: 37%

Time of Test: 8:15 AM

FMH Serial No: 037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
422	338	13.4	23.7	46	0

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axle	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-98.4	1.43	1.43
Y	6	J35841	92.6	1.54	1.54
Z	7	J35791	88.8	1.39	1.39

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: [Signature] Approved By: [Signature] Date: 4/8/05

*Only necessary for NHTSA (Government) Compliance testing.

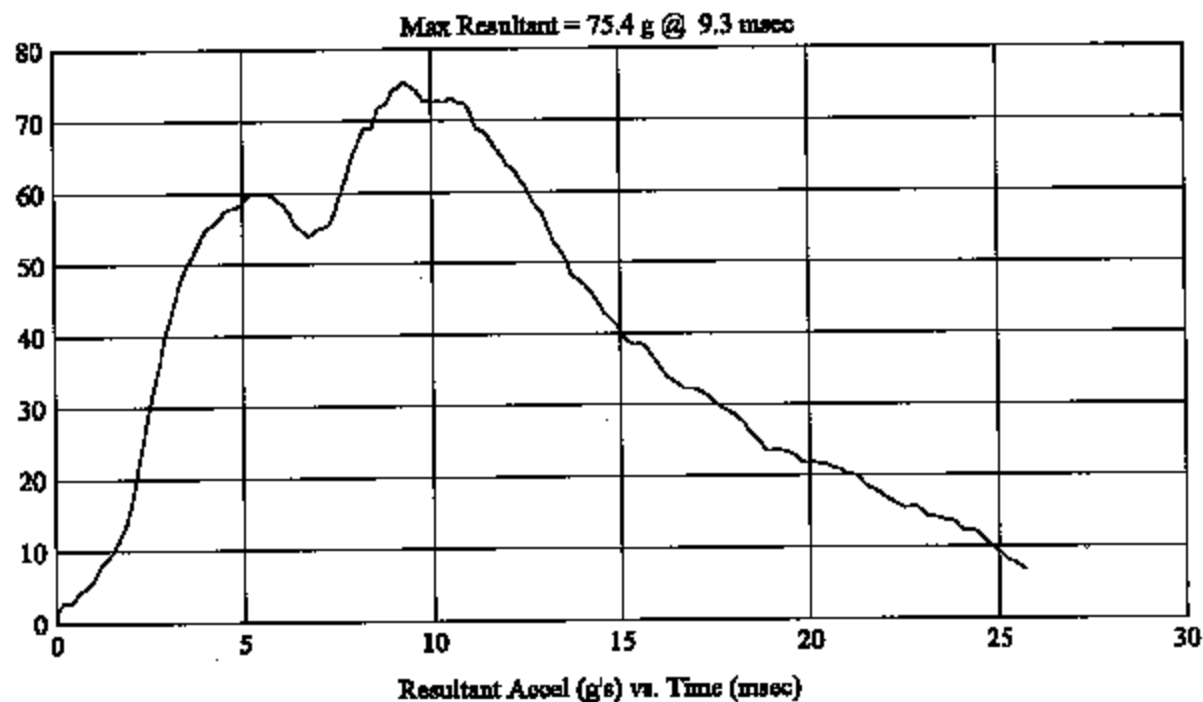
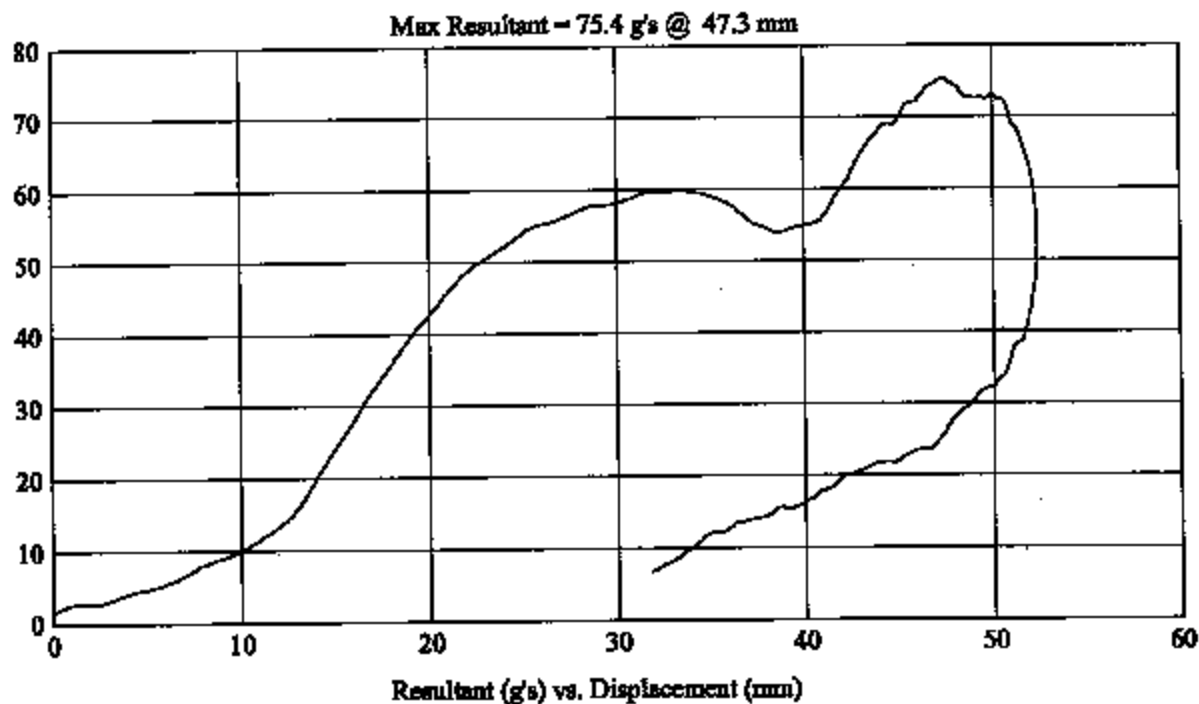
FMH
C0517-001.8Customer: NHTSA
Test # 5
FM5155
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/41

HIC(d) = 422, HIC = 338, Delta T = 13.4 msec



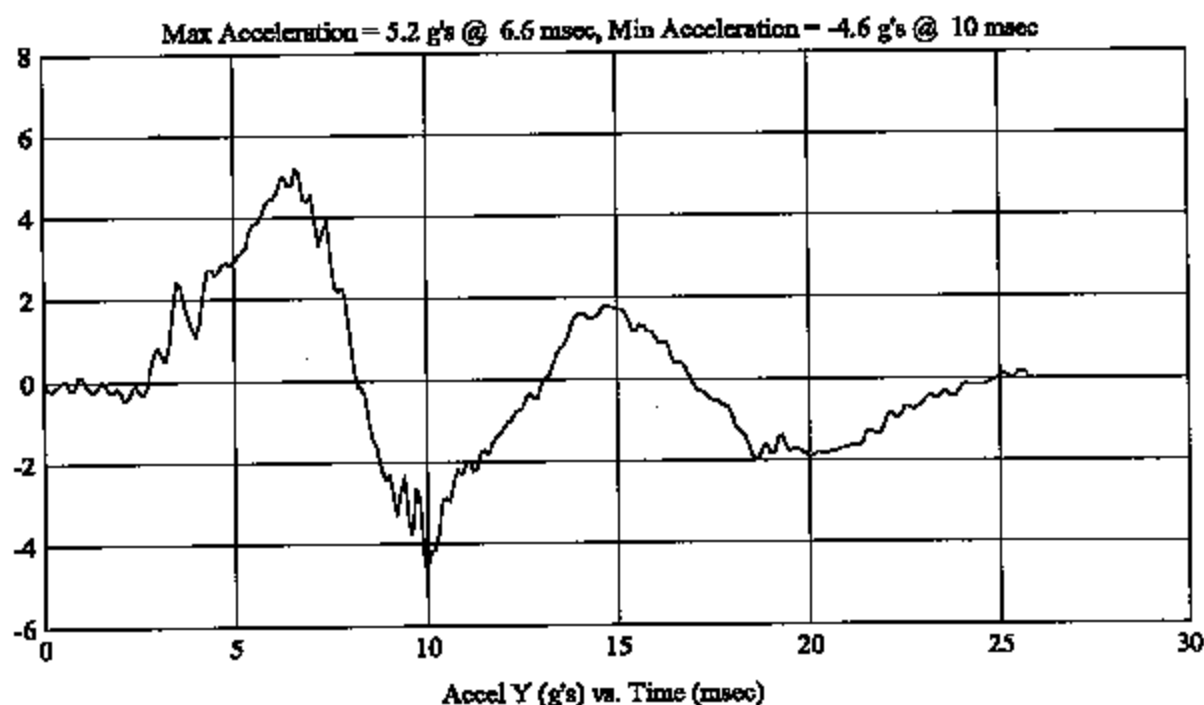
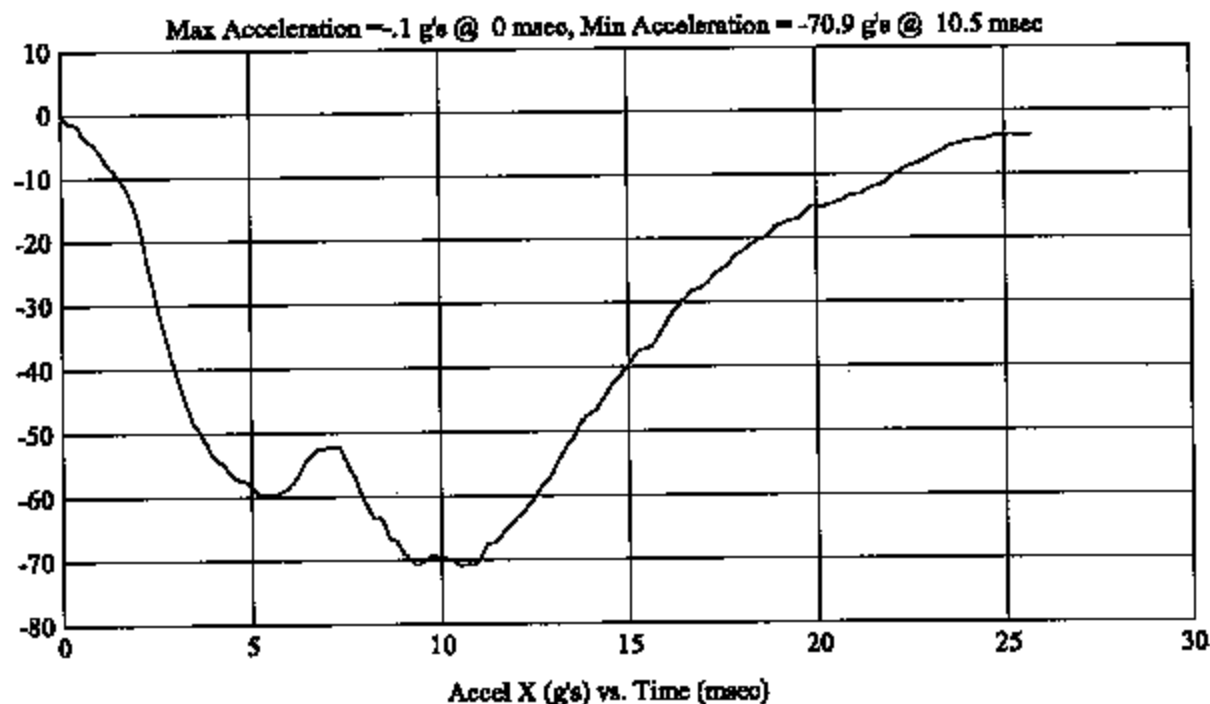
FMH
G0517-001.8Customer: NHTSA
Test # 5
FM5155
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/41

HIC(d) = 422, HIC = 338, Delta T = 13.4 msec



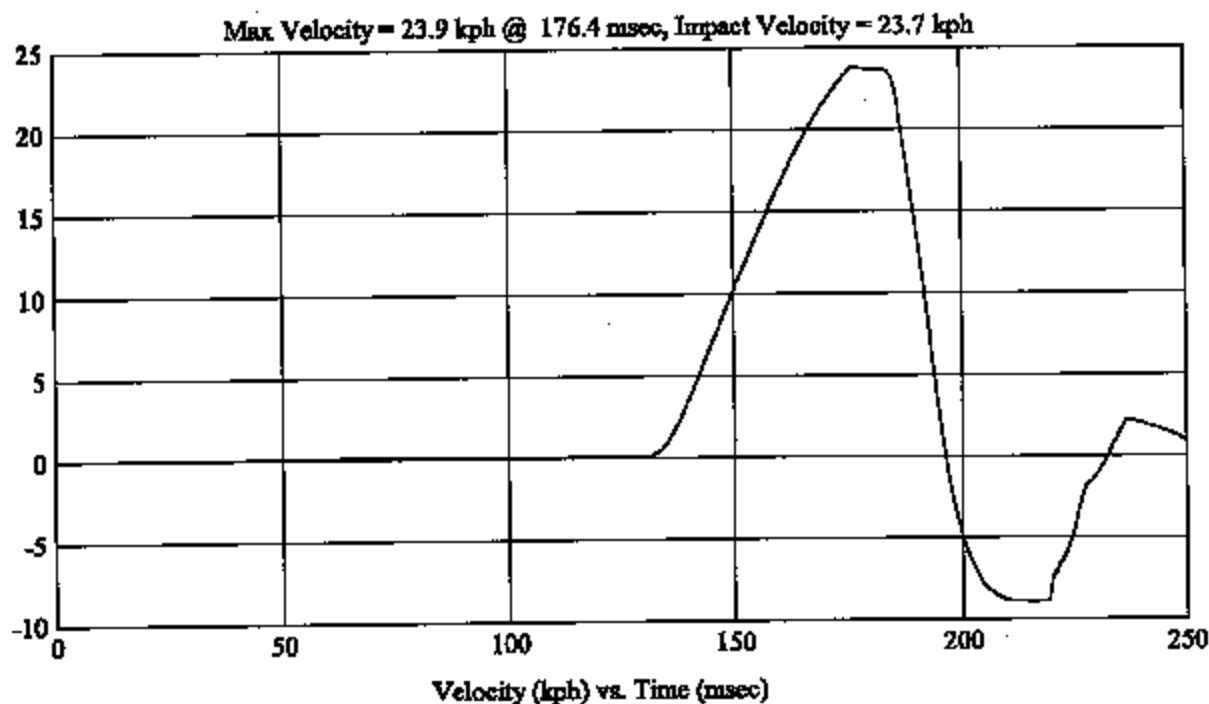
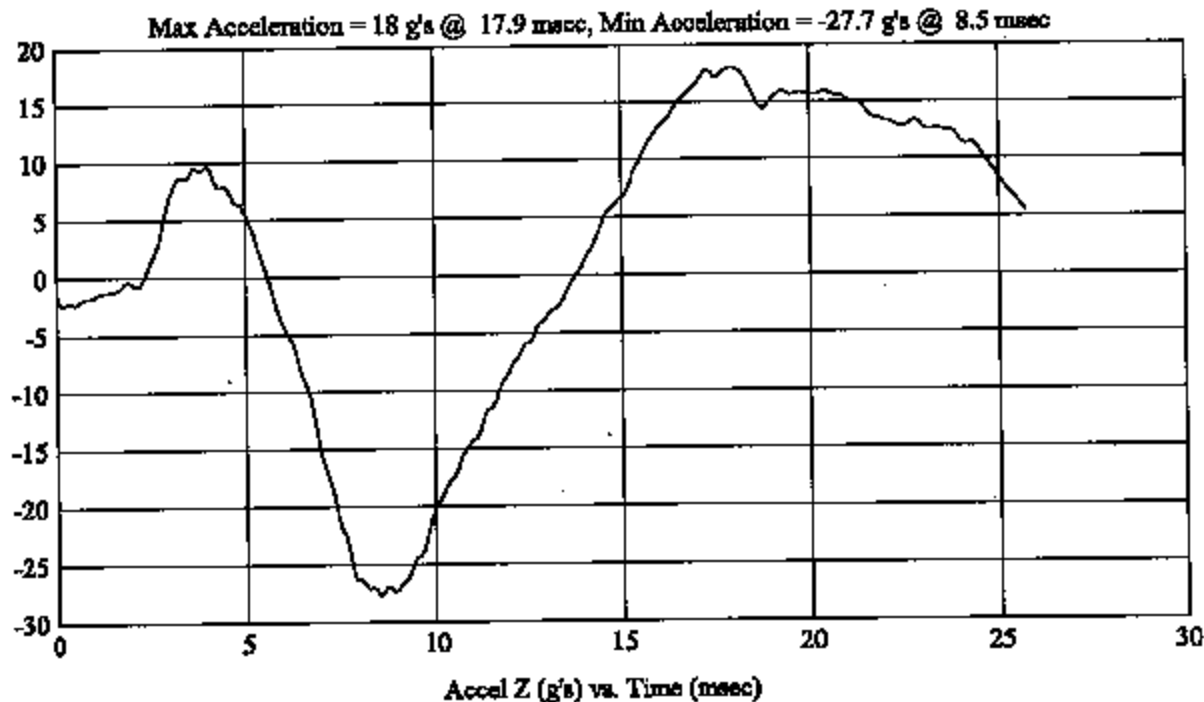
FMH
G05I7-001.8Customer: NHTSA
Test # 5
FM5155
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/41

HIC(d) = 422, HIC = 338, Delta T = 13.4 msec



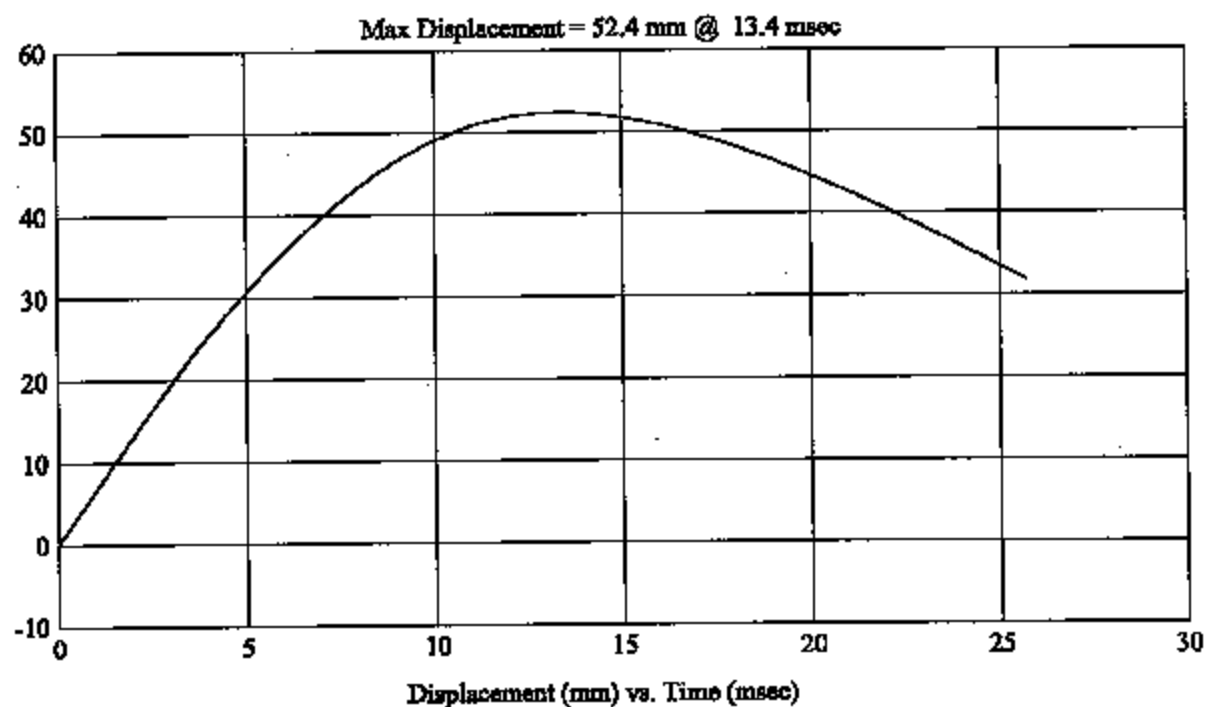
FMH
G0517-001.8Customer: NHTSA
Test # 5
FM5155
Additional Desc: N/A

Vehicle Program : Jeep Grand Cherokee

Test Date: 4/6/05

Model Year: 2005
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/41

HIC(d) = 422, HIC = 338, Delta T = 13.4 msec



4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment for the compliance test series. Items marked with an asterisk are calibrated by an external lab. An additional summary table is given for the pre and post-test calibration data for the Free Motion Headforms. The temperature trace to confirm testing was conducted between 66°F and 78°F (19°C - 26°C) is included in Appendix A. Calibration certificates can be found in Appendix B.

TABLE 4-1 LIST OF ITEMS USED

ITEM	MANUFACTURER NAME	MODEL #	FUNCTION OF ITEM	ACCURACY	CAL. INTERNAL
Head Drop Tower (includes test frame and DAS)	MGA Research Corp.	MGA-100-DC	FMH Calibration	N/A	N/A
Accelerometers	Endevco	7264-2000	Acceleration Data	±0.5%	6 months
*Digital Inclinator	Mitutoyo	PRO 360	Set Angle of FMH/Targeting	0.1°	Annual
FMVSS 201U Test Frame (Includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	035 037 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Redlake	HGLE	Record Event	N/A	N/A
*FARO™	Faro Technologies	S08059801273	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Protractor	Stanley N/A Mitutoyo	325 -- MGA00071	Measurement Targeting FMH setup Horizontal Measurement	1 mm N/A 0.5"	Annual
*Vehicle Scale	Intercomp	26032360	Weighing Vehicle	± .5 kg	Annual
* Scale	Ohaus	MGA00045	Weigh FMH Head	± 0.01 lb	Annual
*Temperature Recorder	Dickson	TM-325	Record Temperature and Humidity	± 1°C ± 1% RH	Annual

TABLE 4-2 FMH CALIBRATION SUMMARY DATA SUMMARY TABLE

FMH Serial #		Weight (lbs)	Temp (°C)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#35	10.02	22.0	27.0	251.0	10.5	Yes
Post	#35	10.02	22.0	30.0	238.1	7.8	Yes
Pre	#37	9.98	22.0	27.0	259.2	11.4	Yes
Post	#37	9.98	22.0	30.0	261.1	13.3	Yes
Pre	#38	9.92	22.0	27.0	229.1	6.8	Yes
Post	#38	9.92	22.0	27.0	248.7	13.9	Yes

RECORDED BY: Nicholas J. BrzuchDATE: April 8, 2005APPROVED BY: David G. Gotwals

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCHDS: MGATPHDT.5

DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

HEADFORM SERIAL NUMBER: <u>035</u> CALIBRATION DATE: <u>4-5-05</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	10.02
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	27
Peak Resultant Acceleration	225 G's to 275 G's	251.0
Peak Lateral Acceleration	15 G's Maximum	10.5
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35924	11-9-04	5-9-05
2	ENDEVCO	7264-2000	J35919	11-9-04	5-9-05
3	ENDEVCO	7264-2000	J22664	11-9-04	5-9-05

REMARKS:

RECORDED BY: J. A. De

DATE: 4-5-05

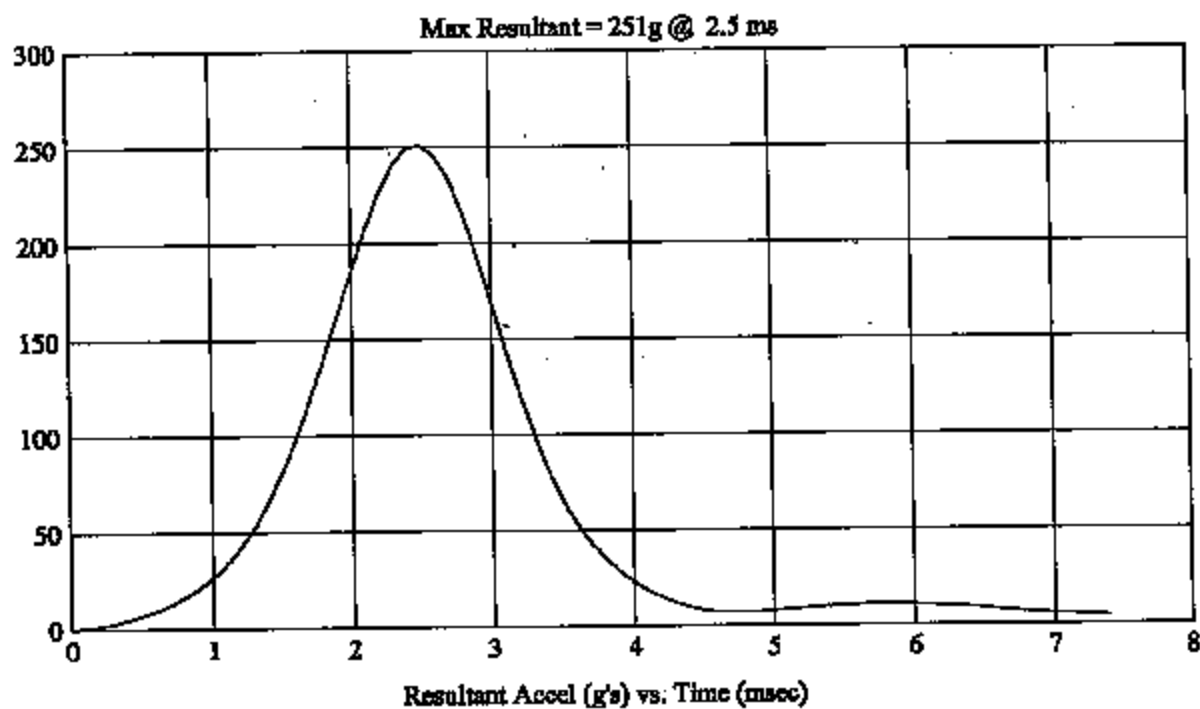
APPROVED BY: [Signature]

Head Drop
(Preliminary Test Report)

Test Number: H35287
Test Description: 10.02

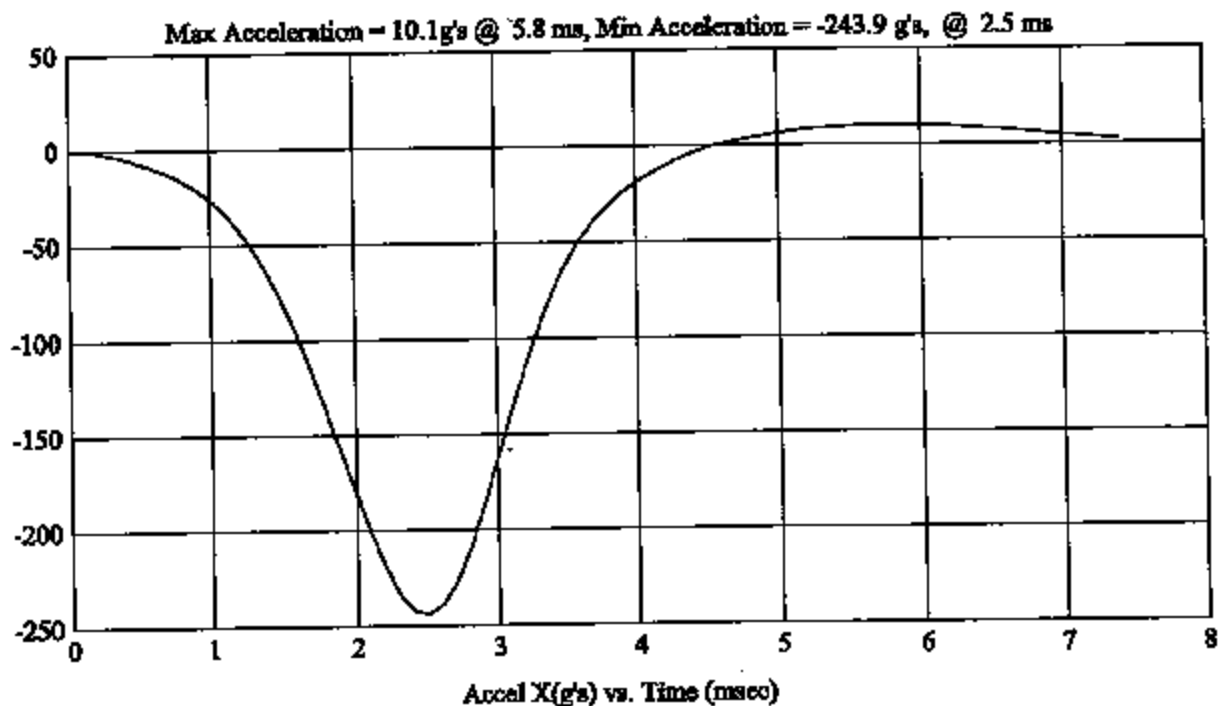
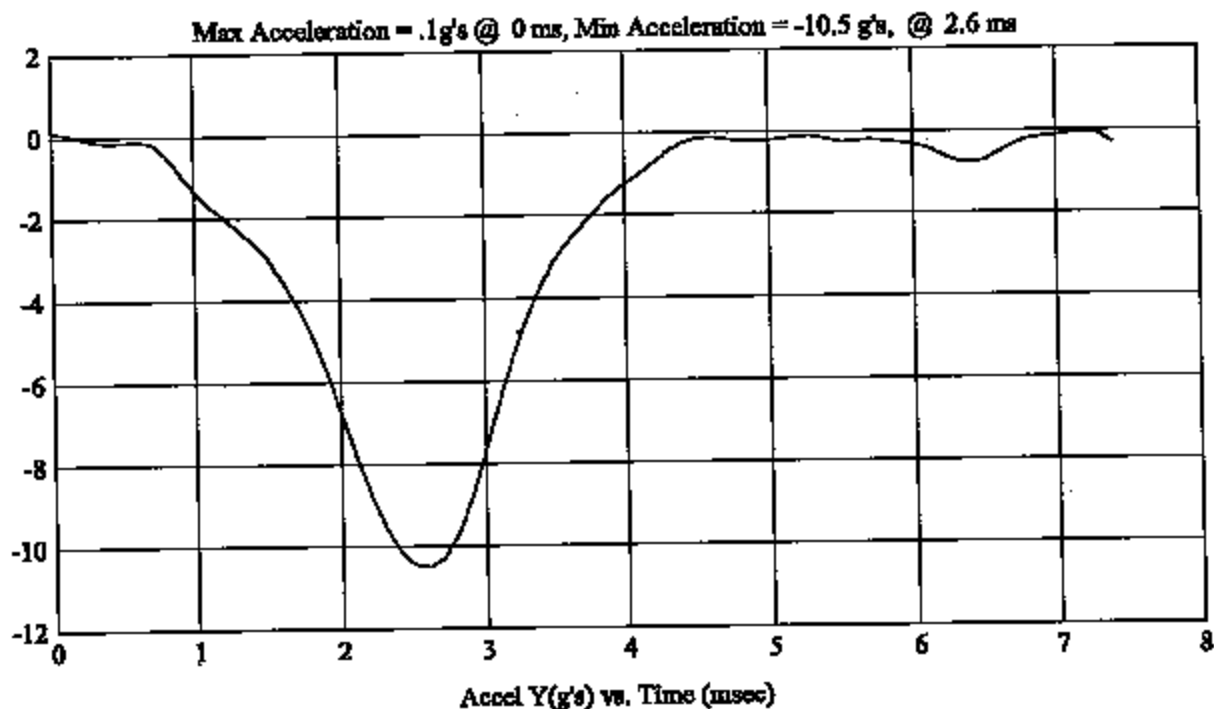
MGA Job Number: G0517-001.8

Test Date: 04/05/2005
Head #: 035



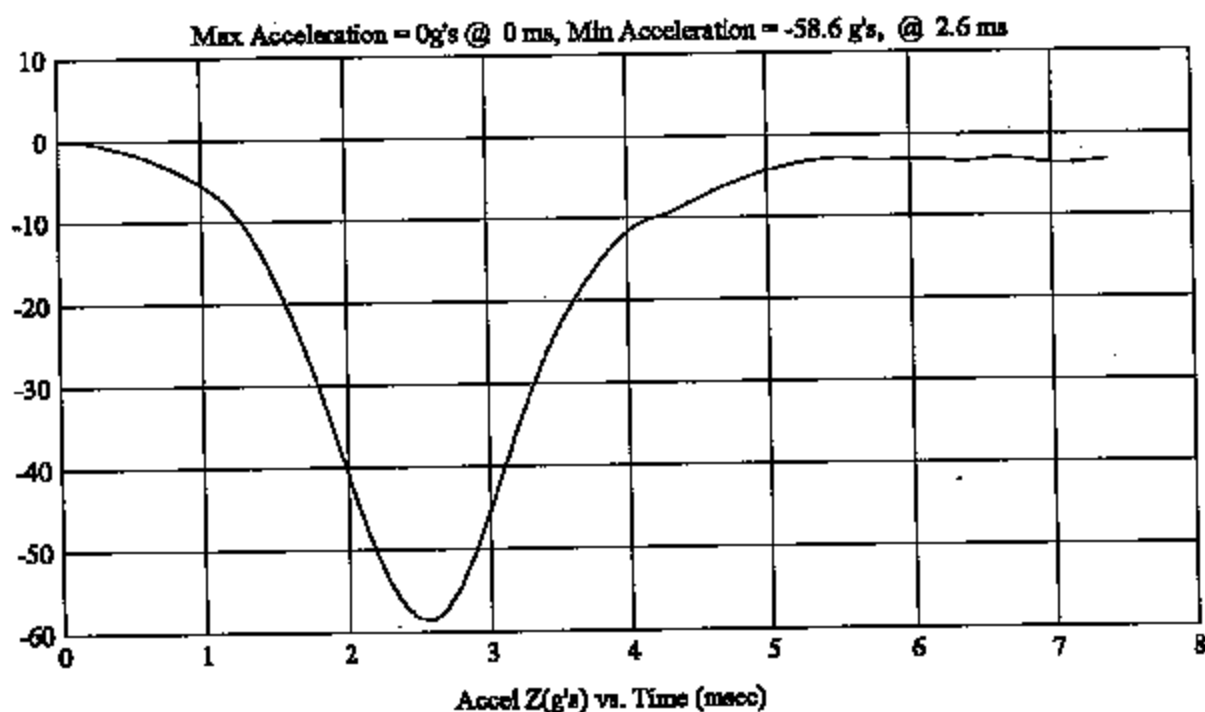
Head Drop
(Preliminary Test Report)Test Number: H35287
Test Description: 10.02

MGA Job Number: G0517-001.8

Test Date: 04/05/2005
Head #: 035

Head Drop
(Preliminary Test Report)Test Number: H35287
Test Description: 10.02

MGA Job Number: G0517-001.8

Test Date: 04/05/2005
Head #: 035

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATPHDT.5

DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

HEADFORM SERIAL NUMBER: <u>035</u>		CALIBRATION DATE: <u>4-8-05</u>
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	10.02
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	30
Peak Resultant Acceleration	225 G's to 275 G's	238.1
Peak Lateral Acceleration	15 G's Maximum	7.8
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	535924	11-9-04	5-9-05
2	ENDEVCO	7264-2000	535919	11-9-04	5-9-05
3	ENDEVCO	7264-2000	522664	11-9-04	5-9-05

REMARKS:

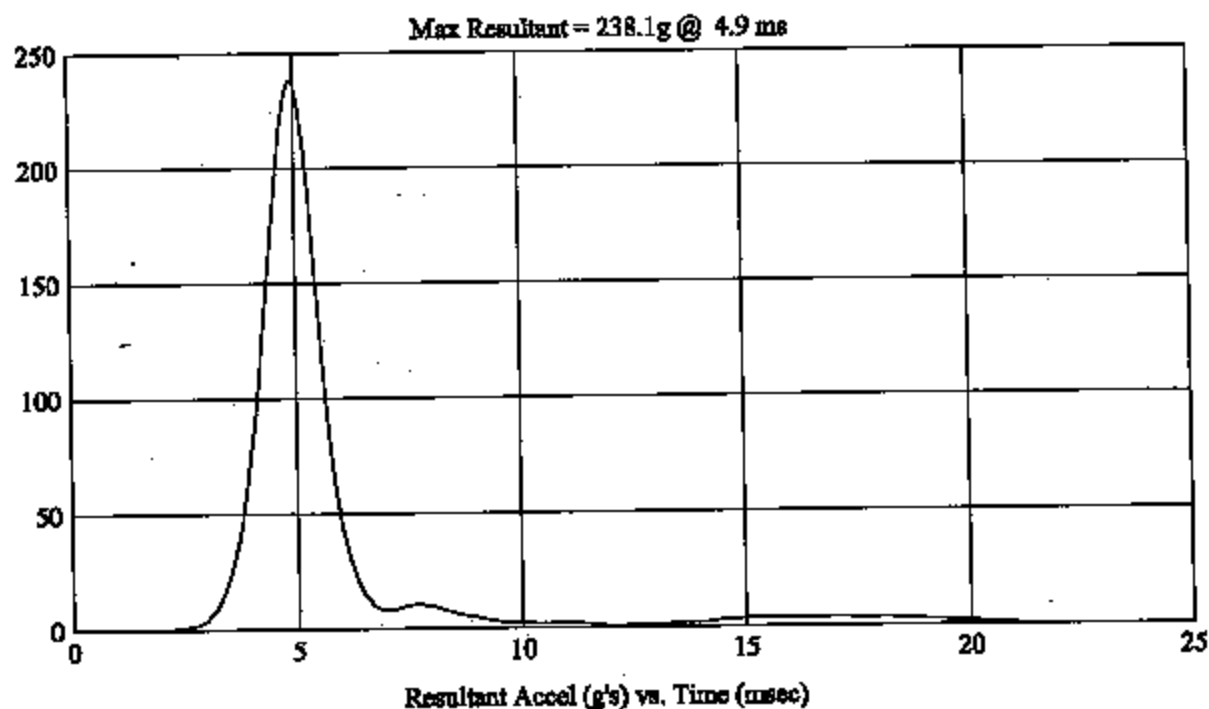
RECORDED BY: Thadde

DATE: 4-8-05

APPROVED BY: mjm

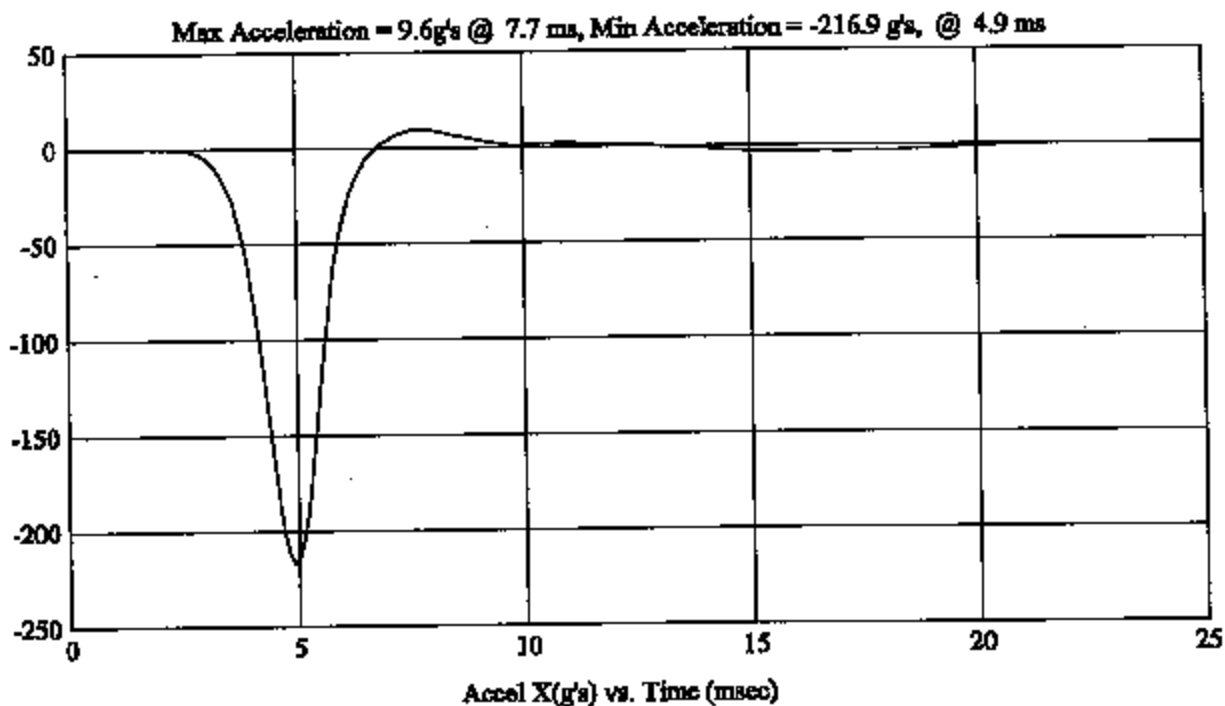
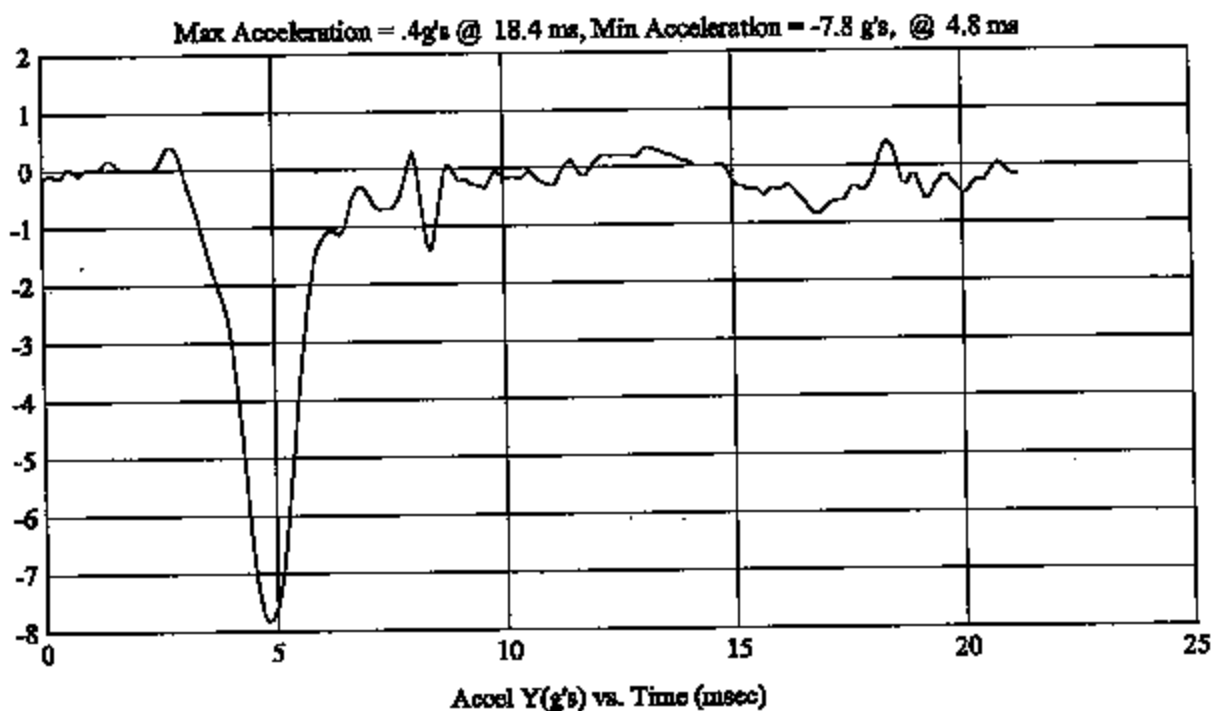
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(Preliminary Test Report)Test Number: H35288
Test Description: 10.02

MGA Job Number: G0517-001.8

Test Date: 04/08/2005
Head #: 035

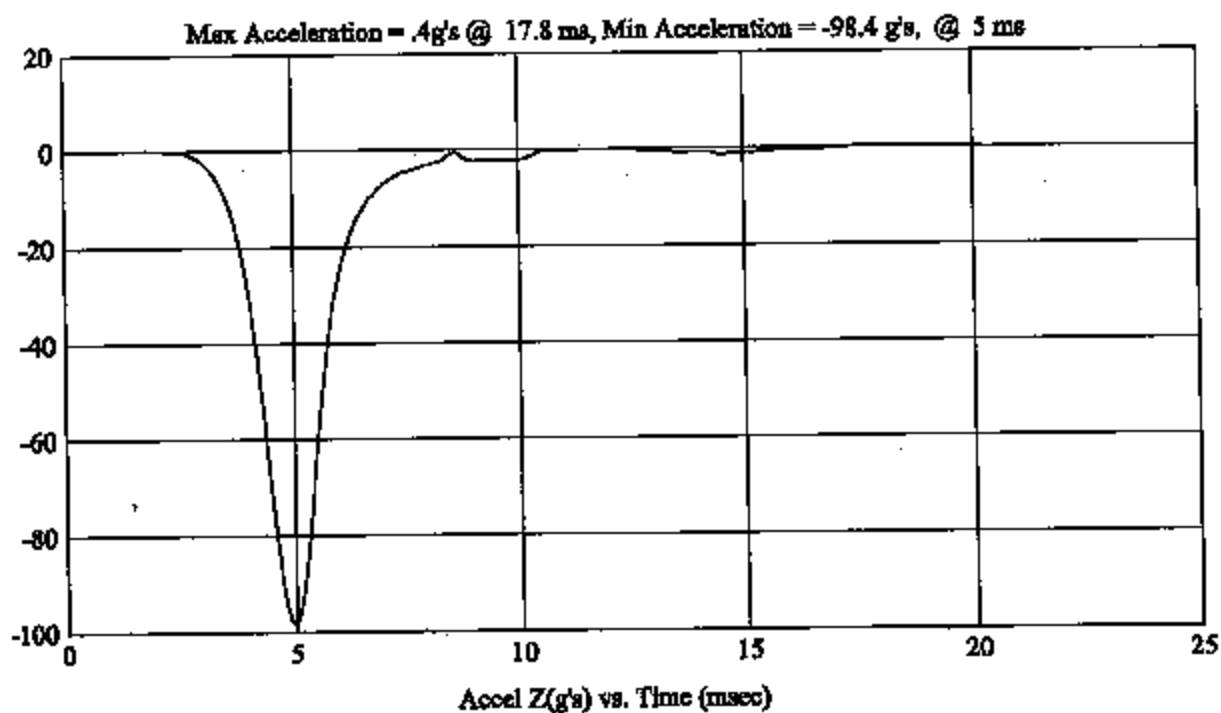
Head Drop
(Preliminary Test Report)Test Number: H35288
Test Description: 10.02

MGA Job Number: G05I7-001.8

Test Date: 04/08/2005
Head #: 035

Head Drop
(Preliminary Test Report)Test Number: H35288
Test Description: 10.02

MGA Job Number: G0517-001.8

Test Date: 04/08/2005
Head #: 035

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCHDPS: MGATPHDT.5

DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

HEADFORM SERIAL NUMBER: <u>037</u>		CALIBRATION DATE: <u>4-5-05</u>
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	27.2 9.96
Temperature	19° C to 26° C	27.2 22
Relative Humidity	10% to 70%	27
Peak Resultant Acceleration	225 G's to 275 G's	259.2
Peak Lateral Acceleration	15 G's Maximum	11.4
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	535800	11-9-09	5-9-05
2	ENDEVCO	7264-2000	535841	11-9-04	5-9-05
3	ENDEVCO	7264-2000	535791	11-9-04	5-9-05

REMARKS:

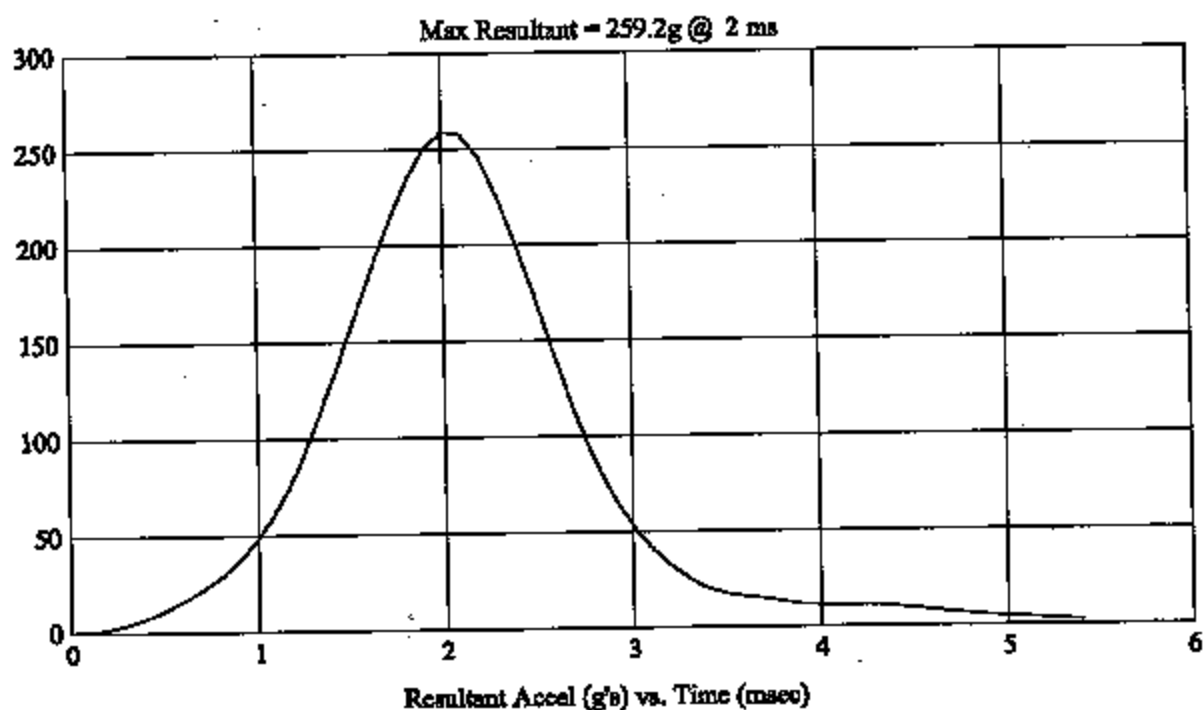
RECORDED BY: R.A.M.

DATE: 4-5-05

APPROVED BY: [Signature]

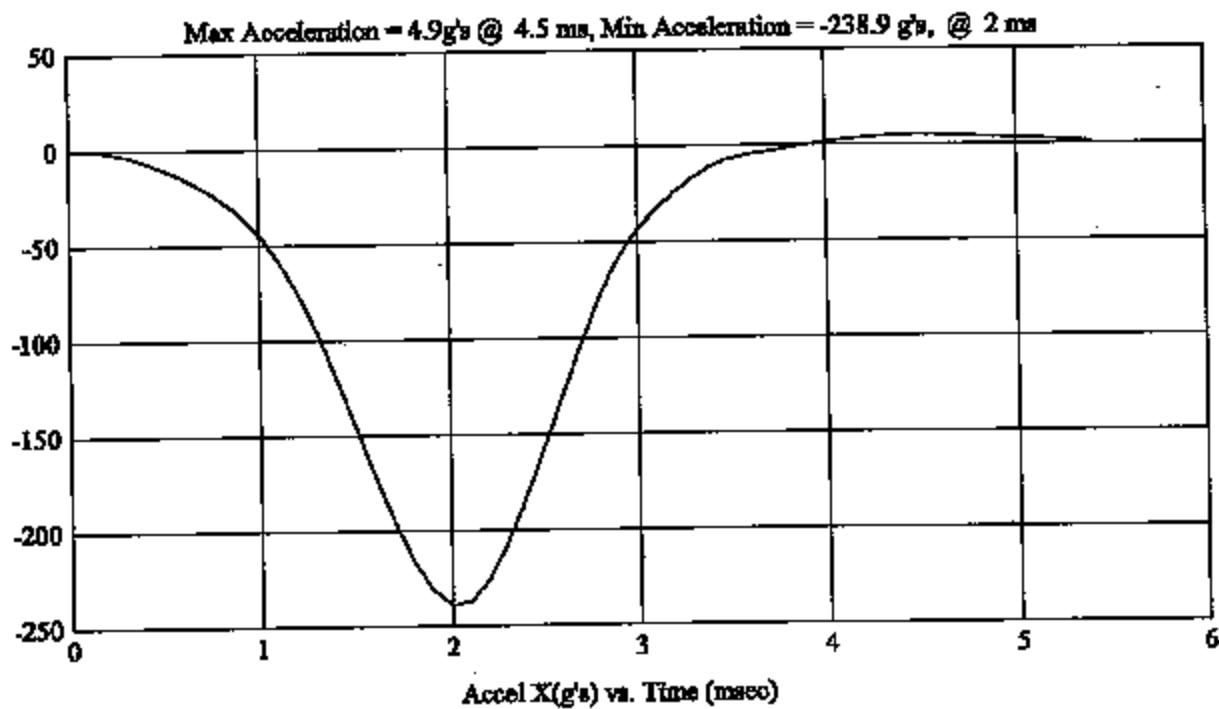
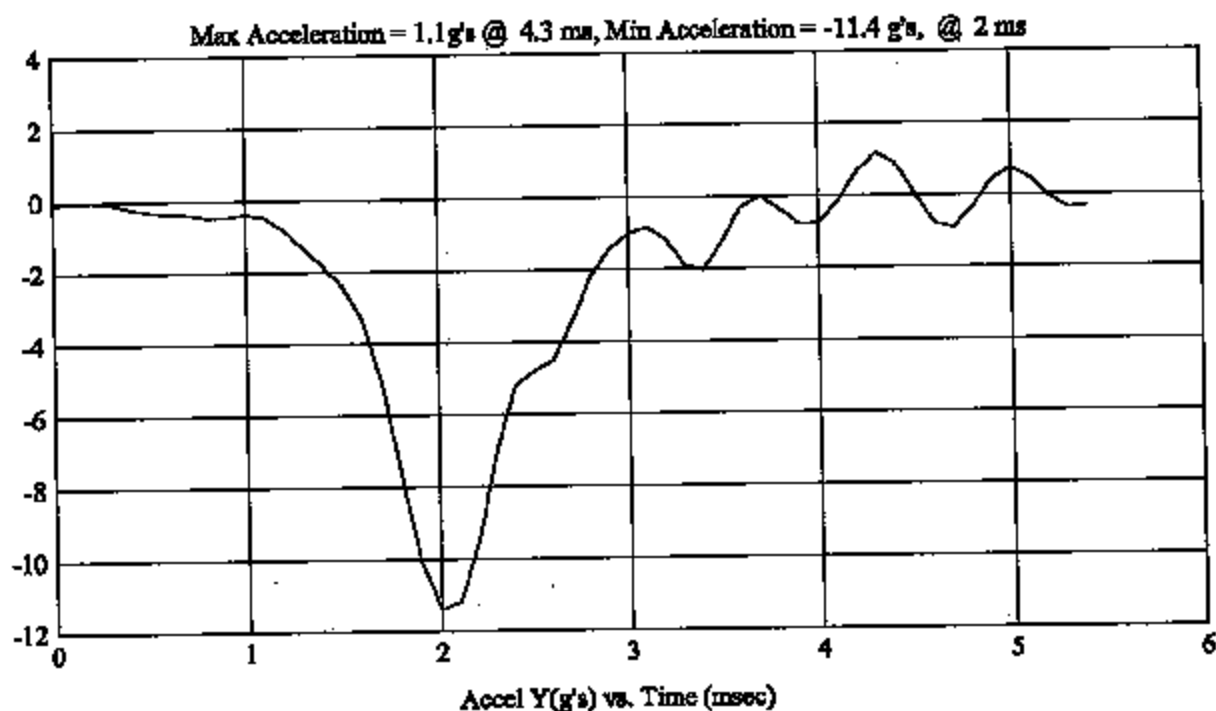
Head Drop
(Preliminary Test Report)Test Number: H37158
Test Description: 9.96

MGA Job Number: G0517-001.8

Test Date: 04/05/2005
Head #: 037

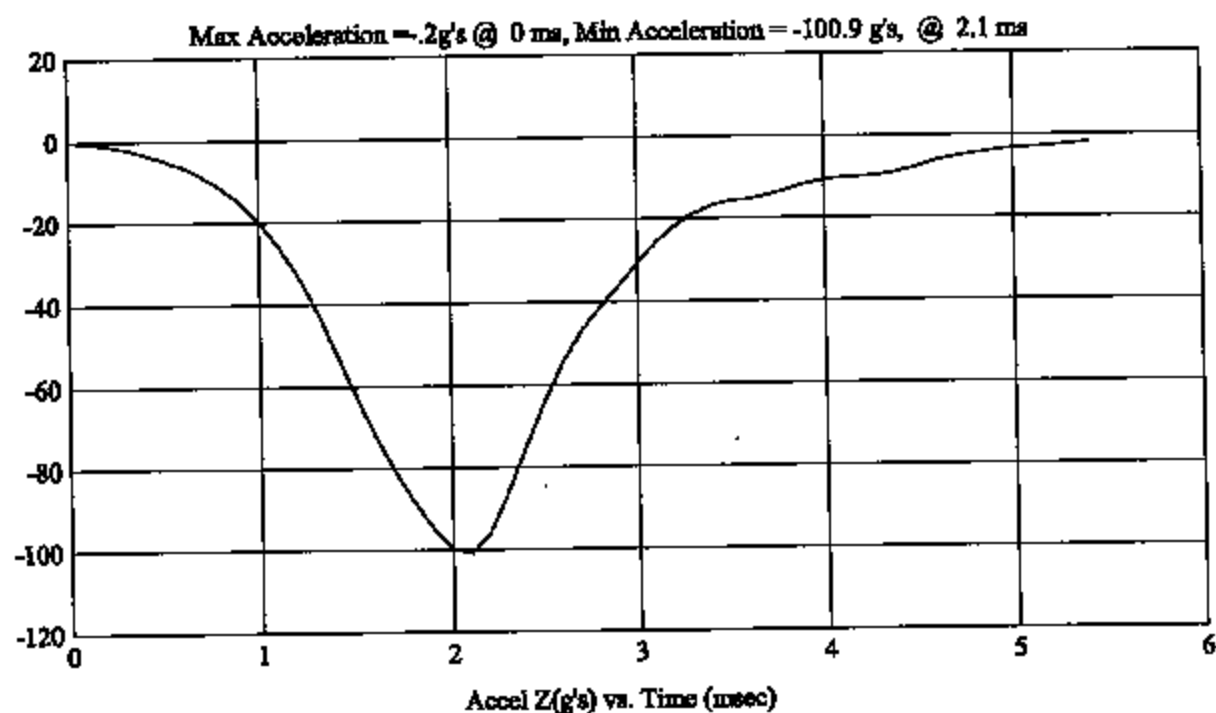
Head Drop
(Preliminary Test Report)Test Number: H37158
Test Description: 9.96

MGA Job Number: G0517-001.8

Test Date: 04/05/2005
Head #: 037

Head Drop
(Preliminary Test Report)Test Number: H37158
Test Description: 9.96

MGA Job Number: G05F7-001.8

Test Date: 04/05/2005
Head #: 037

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATPHDT'S

DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

4-11-05 BA

HEADFORM SERIAL NUMBER: 037		CALIBRATION DATE: 4-8-05
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	30
Peak Resultant Acceleration	225 G's to 275 G's	261.1
Peak Lateral Acceleration	15 G's Maximum	13.3
Unimodal Acceleration Curve	YES	Yes

FME INSTRUMENTATION

HEAD ACCELEROMETERS

Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35800	11-9-04	5-9-05
2	ENDEVCO	7264-2000	J35841	11-9-04	5-9-05
3	ENDEVCO	7264-2000	J35791	11-9-04	5-9-05

REMARKS:

RECORDED BY:

R. A. G. H.

DATE:

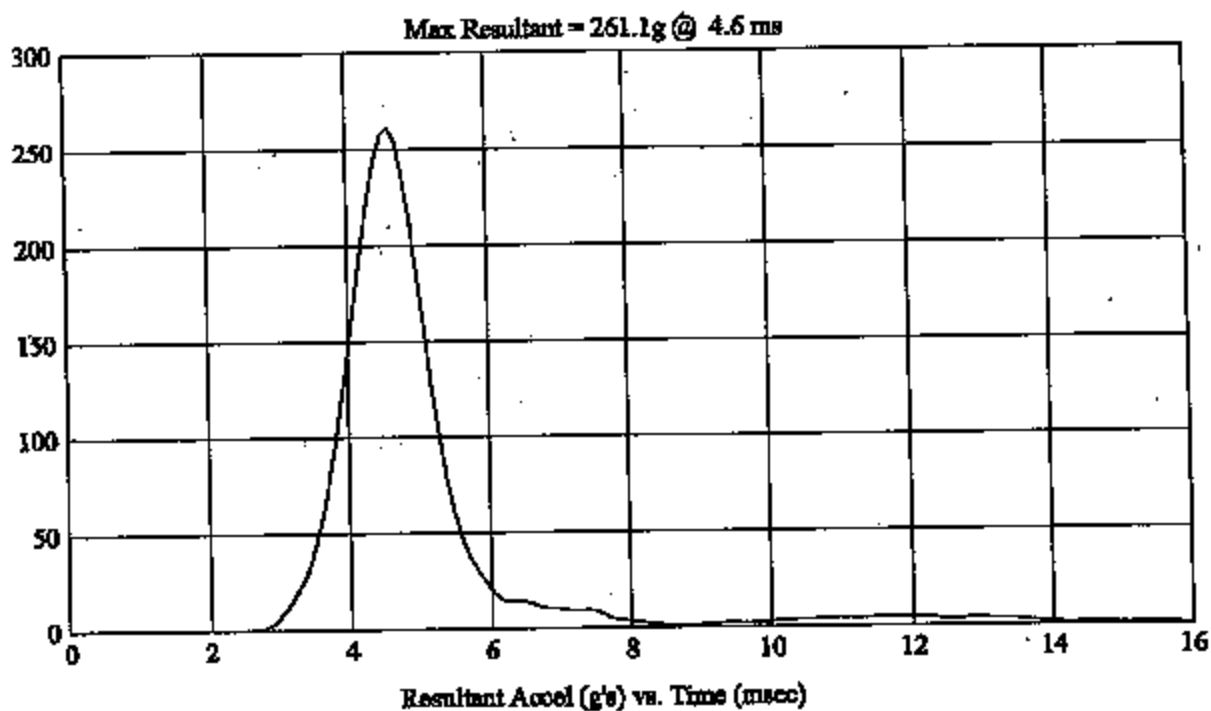
4-11-05 BA
4-8-05

APPROVED BY:

R. J. M.

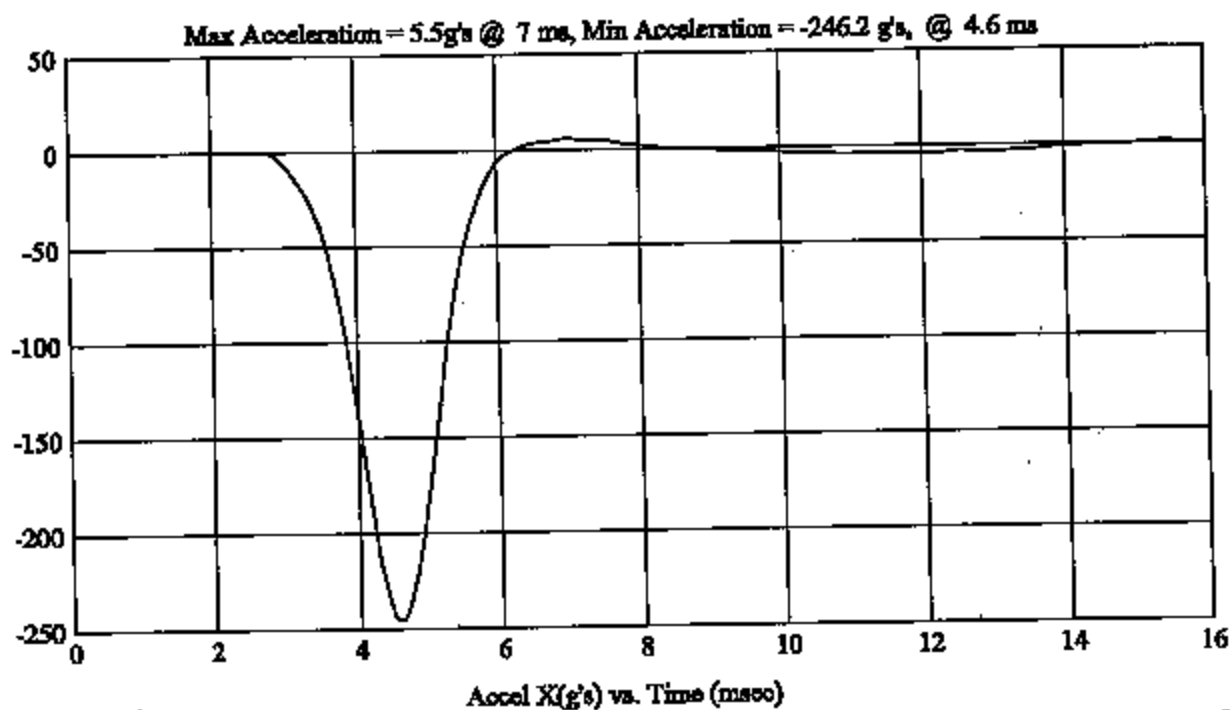
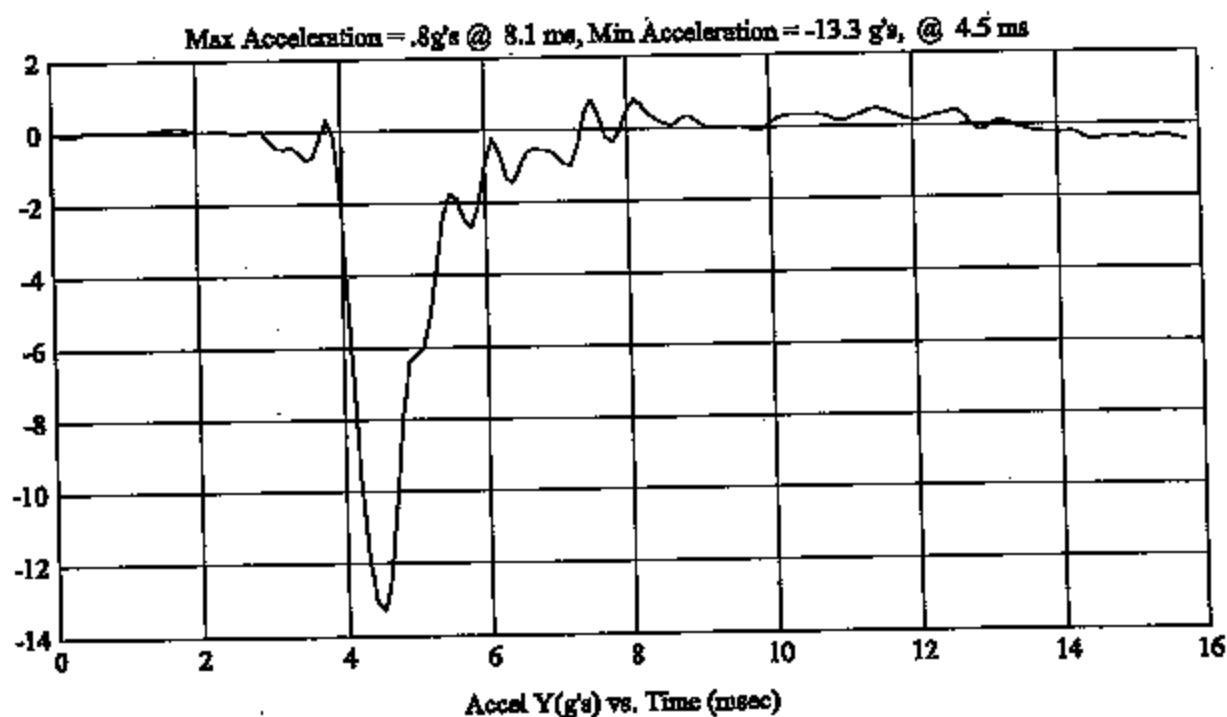
Head Drop
(Preliminary Test Report)Test Number: H37159
Test Description: 9.96

MGA Job Number: G0517-001.8

Test Date: 04/11/2005
Head #: 037

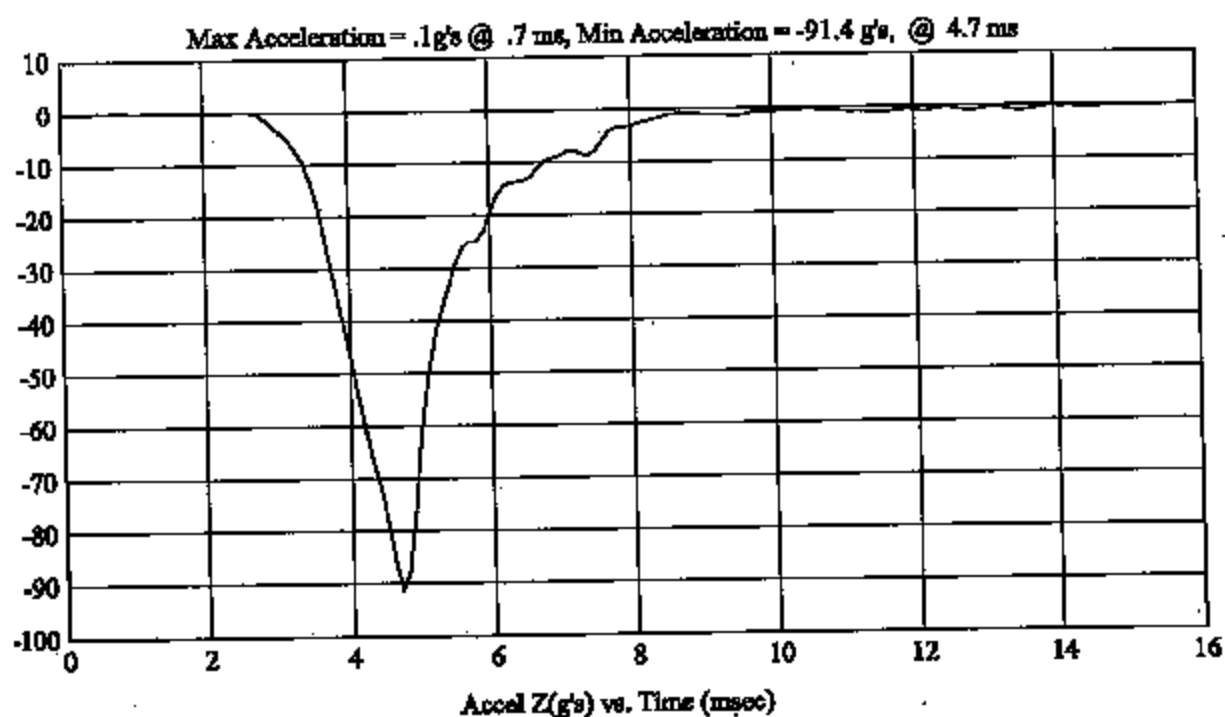
Head Drop
(Preliminary Test Report)Test Number: H37139
Test Description: 9.96

MGA Job Number: G05I7-001.8

Test Date: 04/11/2005
Head #: 037

Head Drop
(Preliminary Test Report)Test Number: H37159
Test Description: 9.96

MGA Job Number: G0517-001.8

Test Date: 04/11/2005
Head #: 037

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATPHDT.5

DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

HEADFORM SERIAL NUMBER: <u>038</u> CALIBRATION DATE: <u>4-5-05</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.92
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	27
Peak Resultant Acceleration	225 G's to 275 G's	229.1
Peak Lateral Acceleration	15 G's Maximum	6.6
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
	ENDEVCO	7264-2000	J36197	11-9-04	5-9-05
	ENDEVCO	7264-2000	J36193	11-9-04	5-9-05
	ENDEVCO	7264-2000	J36353	11-9-04	5-9-05

REMARKS:

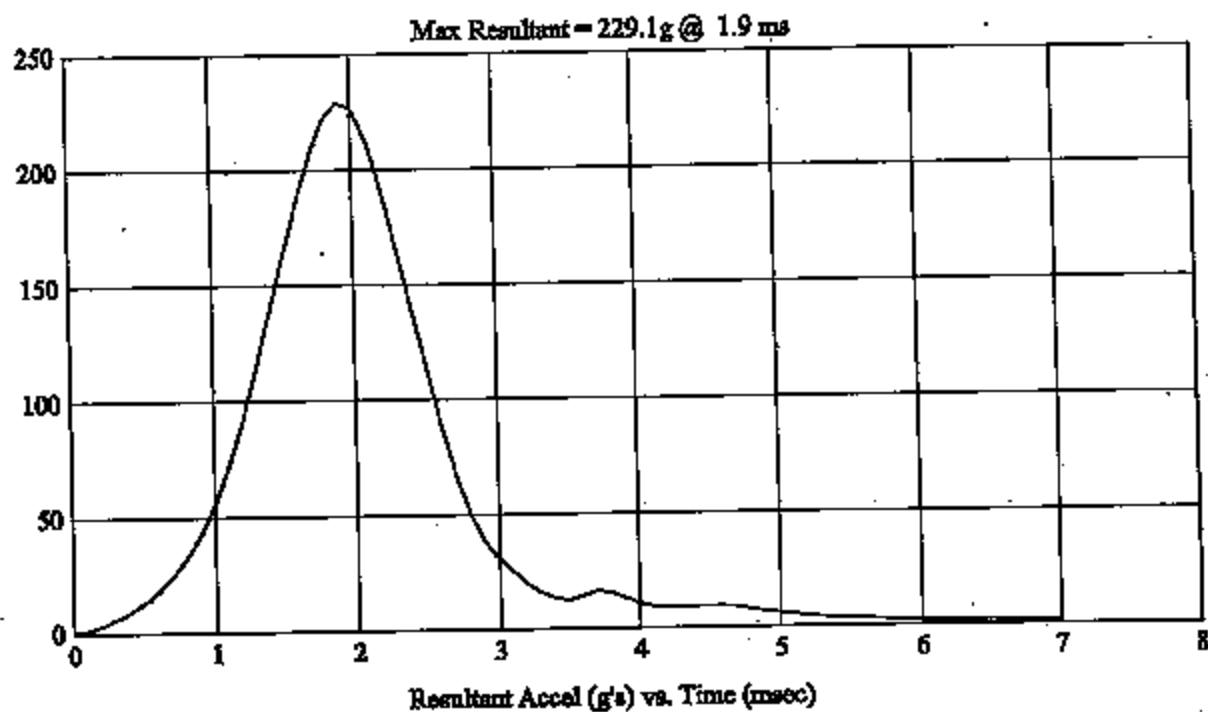
RECORDED BY: Ph. G. Hall

DATE: 4-5-05

APPROVED BY: [Signature]

Head Drop
(Preliminary Test Report)Test Number: H38267
Test Description: 9.92

MGA Job Number: C0517-001.8

Test Date: 04/05/2005
Head #: 038

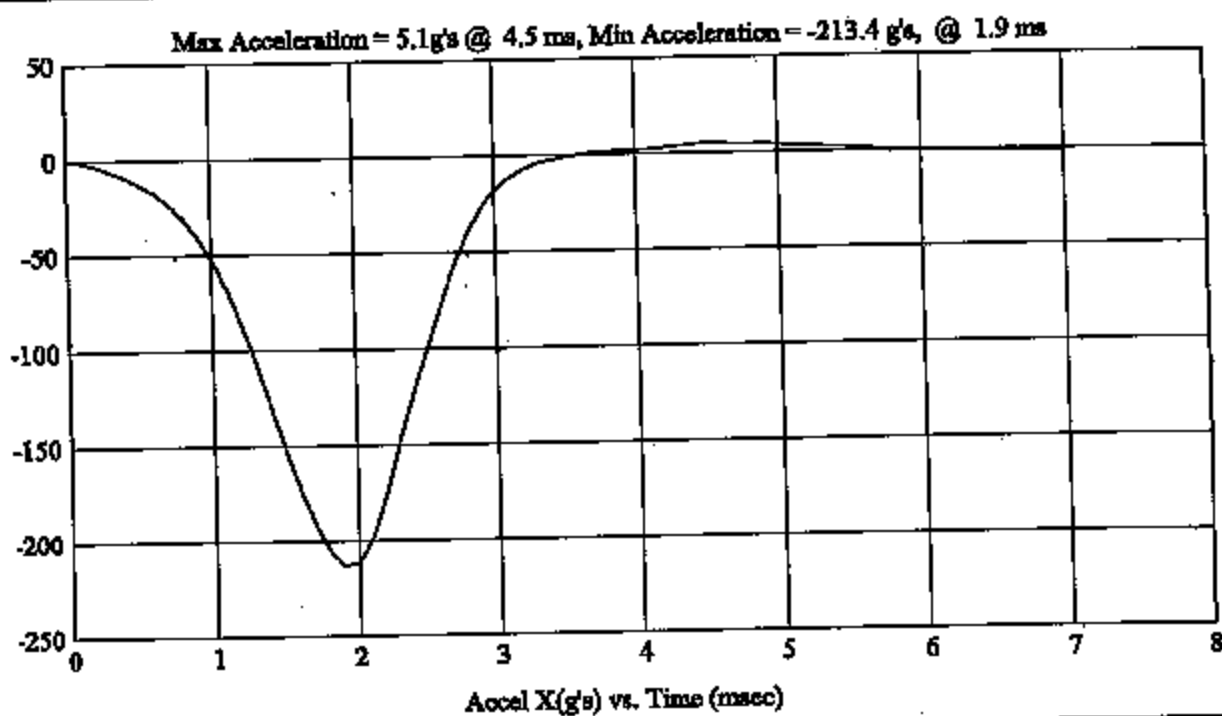
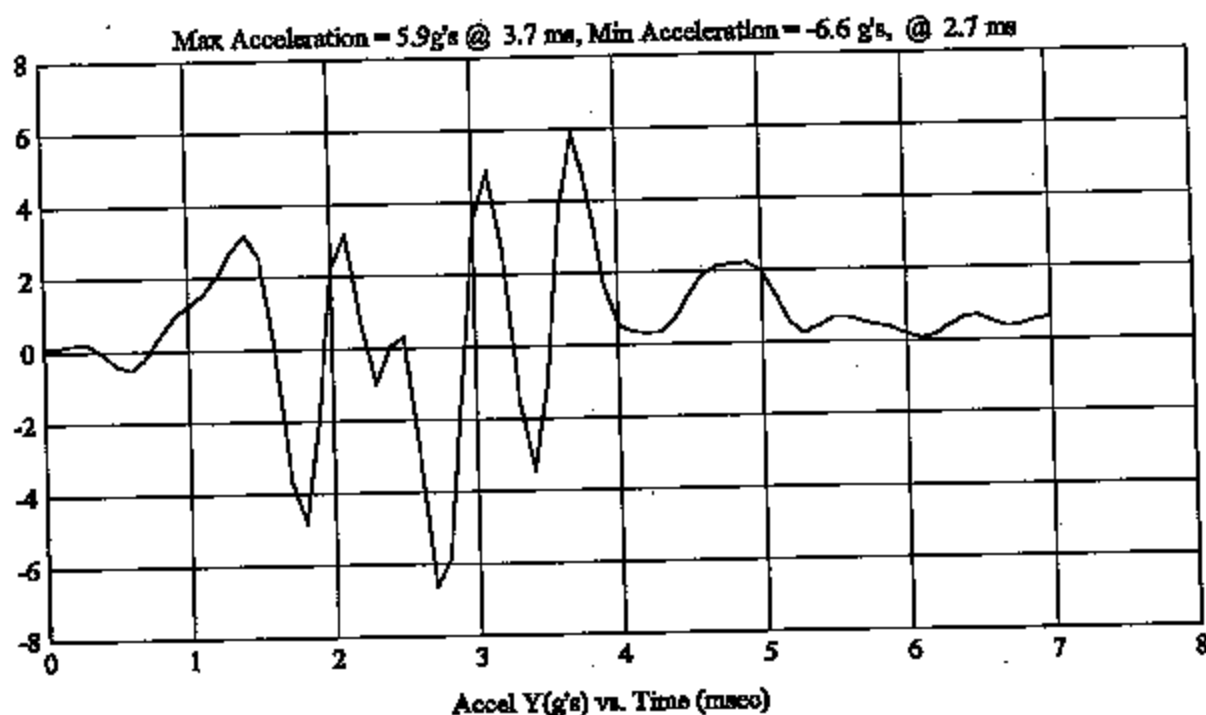
Head Drop
(Preliminary Test Report)

4-21

Test Number: H38267
Test Description: 9.92

MGA Job Number: C0517-001.8

Test Date: 04/05/2005
Head #: 038



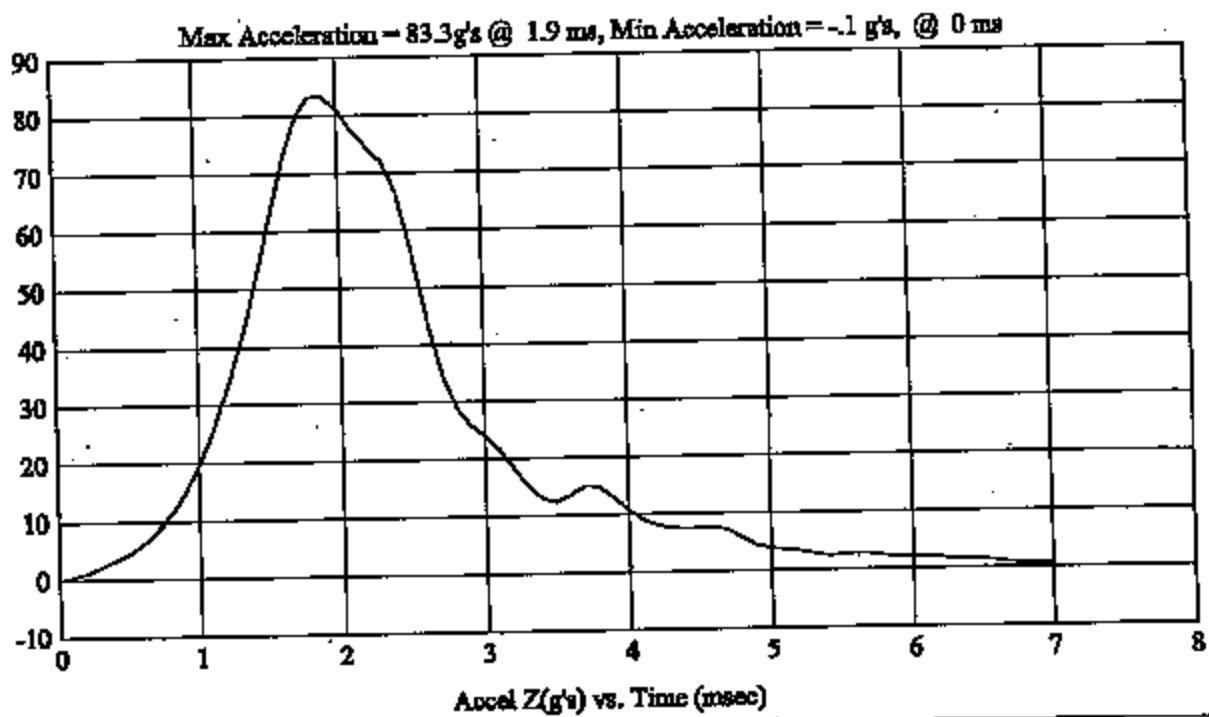
Head Drop
(Preliminary Test Report)

4-22

Test Number: H38267
Test Description: 9.92

MGA Job Number: C05I7-001.8

Test Date: 04/05/2005
Head #: 038



MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCHARGES: MGATPHDT.5

DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

4-11-05 B4

HEADFORM SERIAL NUMBER: <u>038</u> CALIBRATION DATE: <u>4-8-05</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.92
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	30
Peak Resultant Acceleration	225 G's to 275 G's	248.7
Peak Lateral Acceleration	15 G's Maximum	13.9
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J36197	11-9-04	5-9-05
2	ENDEVCO	7264-2000	J36193	11-9-04	5-9-05
3	ENDEVCO	7264-2000	J36353	11-9-04	5-9-05

REMARKS:

RECORDED BY:

[Signature]

DATE:

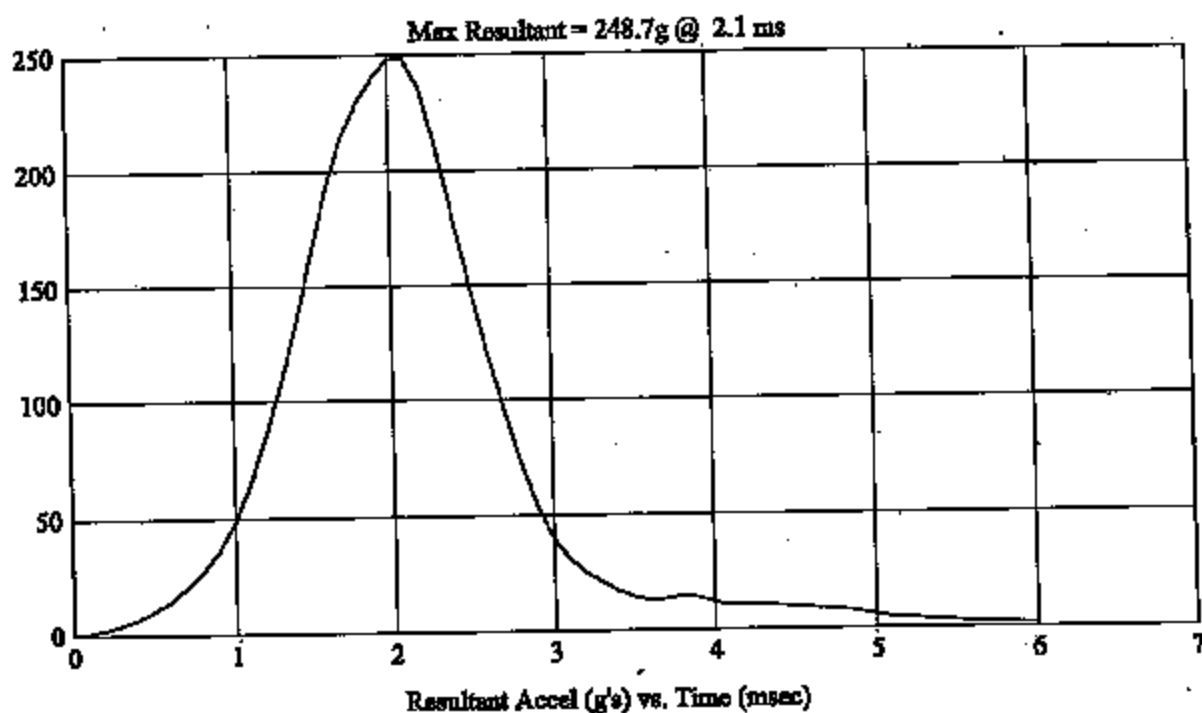
4-11-05 B4
4-8-05

APPROVED BY:

[Signature]

Head Drop
(Preliminary Test Report)Test Number: E38268
Test Description: 9.92

MGA Job Number: G0517-001.8

Test Date: 04/11/2005
Head #: 038

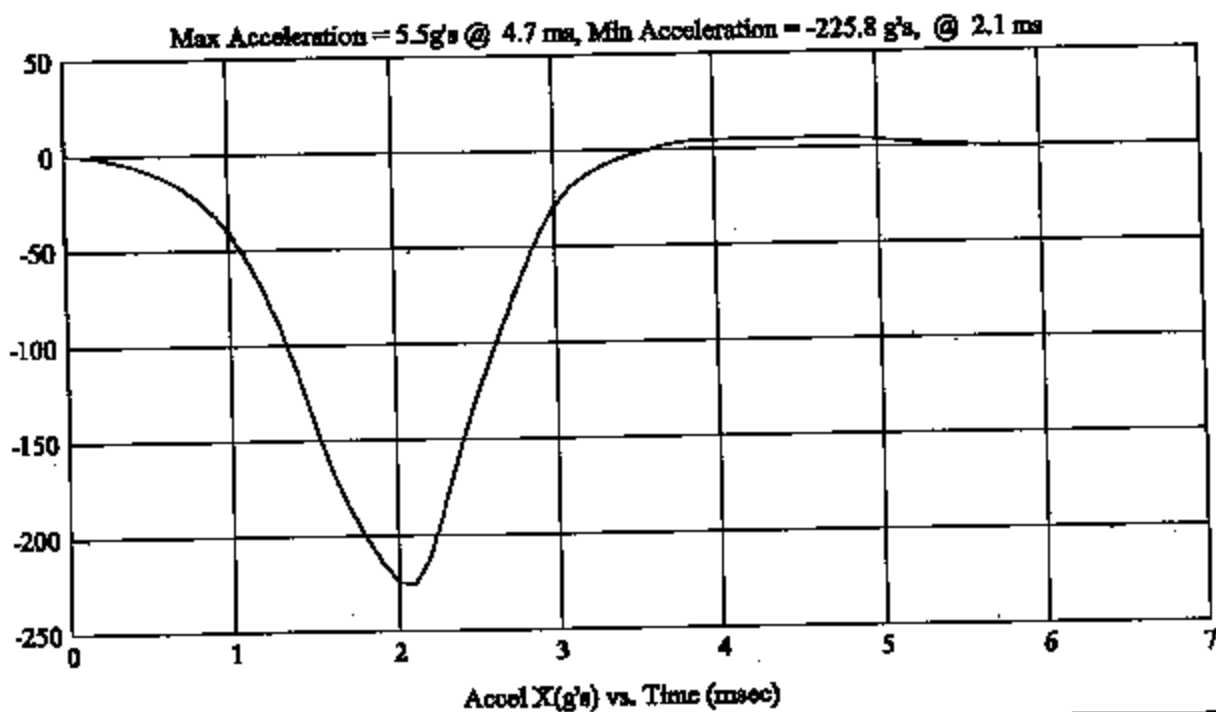
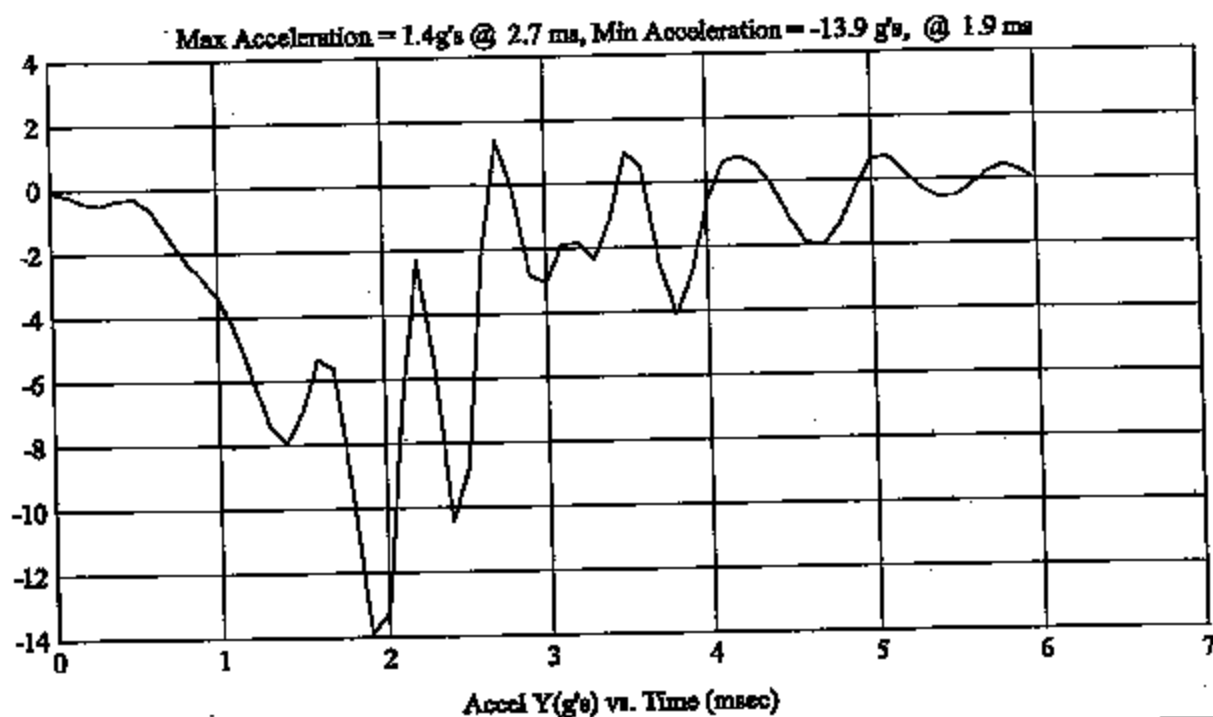
Head Drop
(Preliminary Test Report)

4-25

Test Number: H38268
Test Description: 9.92

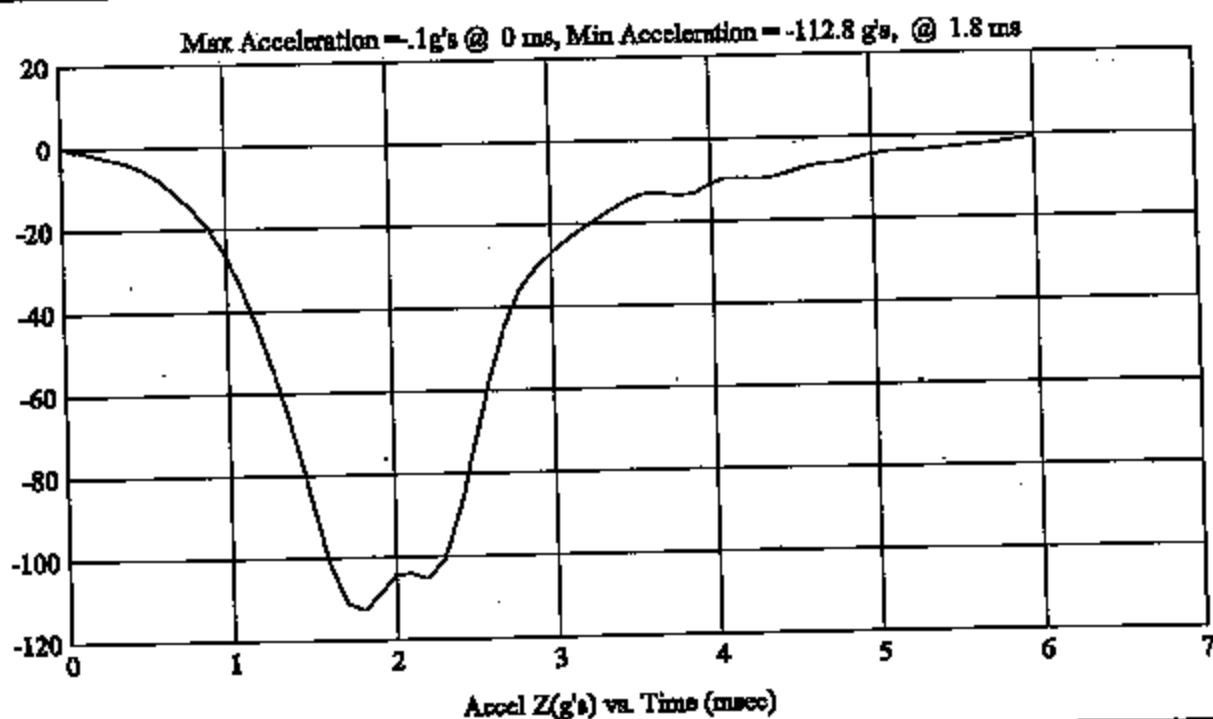
MGA Job Number: G0517-001.8

Test Date: 04/11/2005
Head #: 038



Head Drop
(Preliminary Test Report)Test Number: H38268
Test Description: 9.92

MGA Job Number: G05I7-001.8

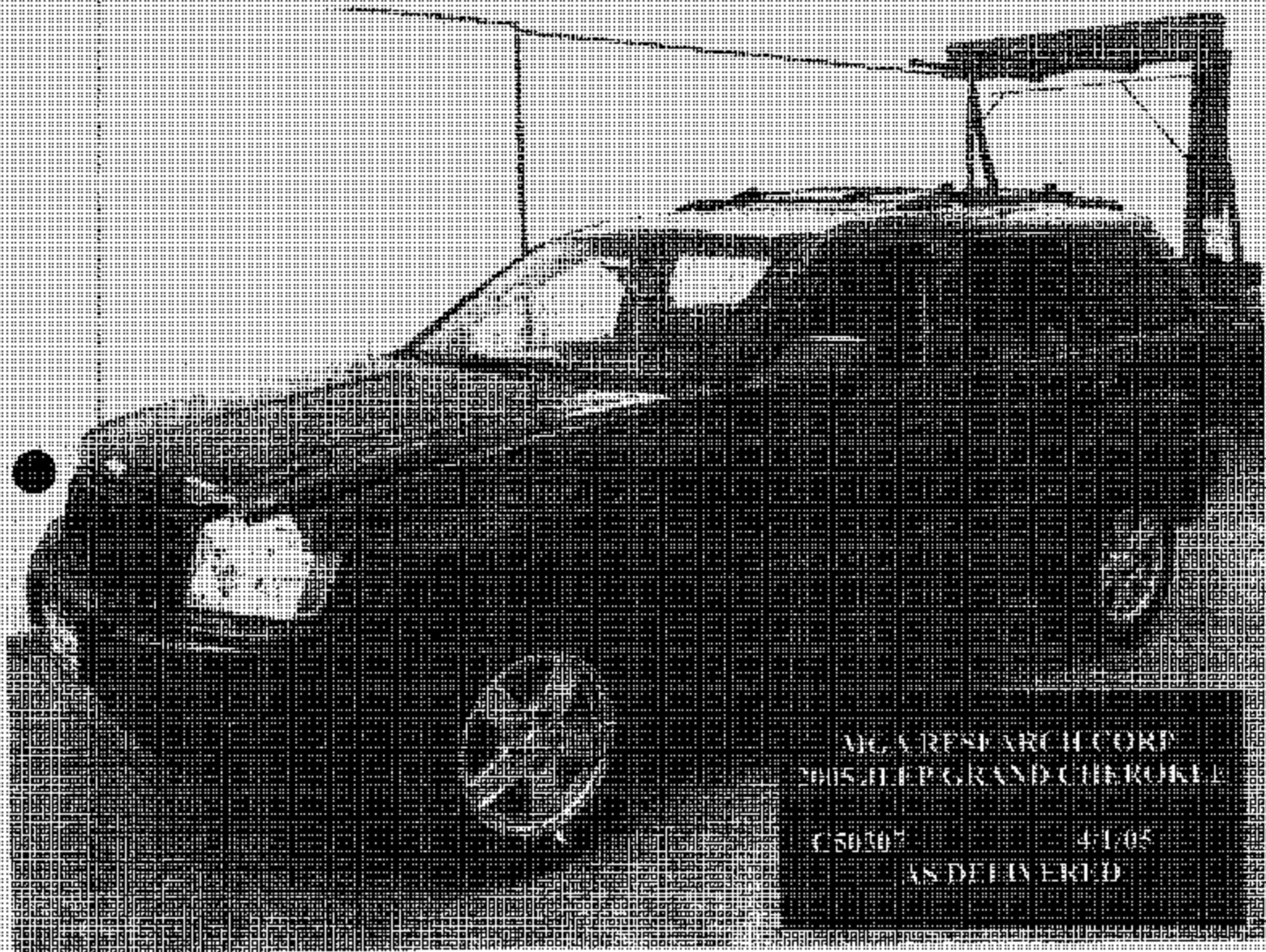
Test Date: 04/11/2003
Head #: 038



YEA RESEARCH CORP
2005 JEEP GRAND CHEROKEE
CS0302 4105
AS DELIVERED

VEGA RESEARCH CORP
2005 JEEP GRAND CHEROKEE

C30007 47105
AS DELIVERED



MC CRENSHAW CORP
2005 JEEP GRAND CHEROKEE

650107

4-1-05

AND DELIVERED

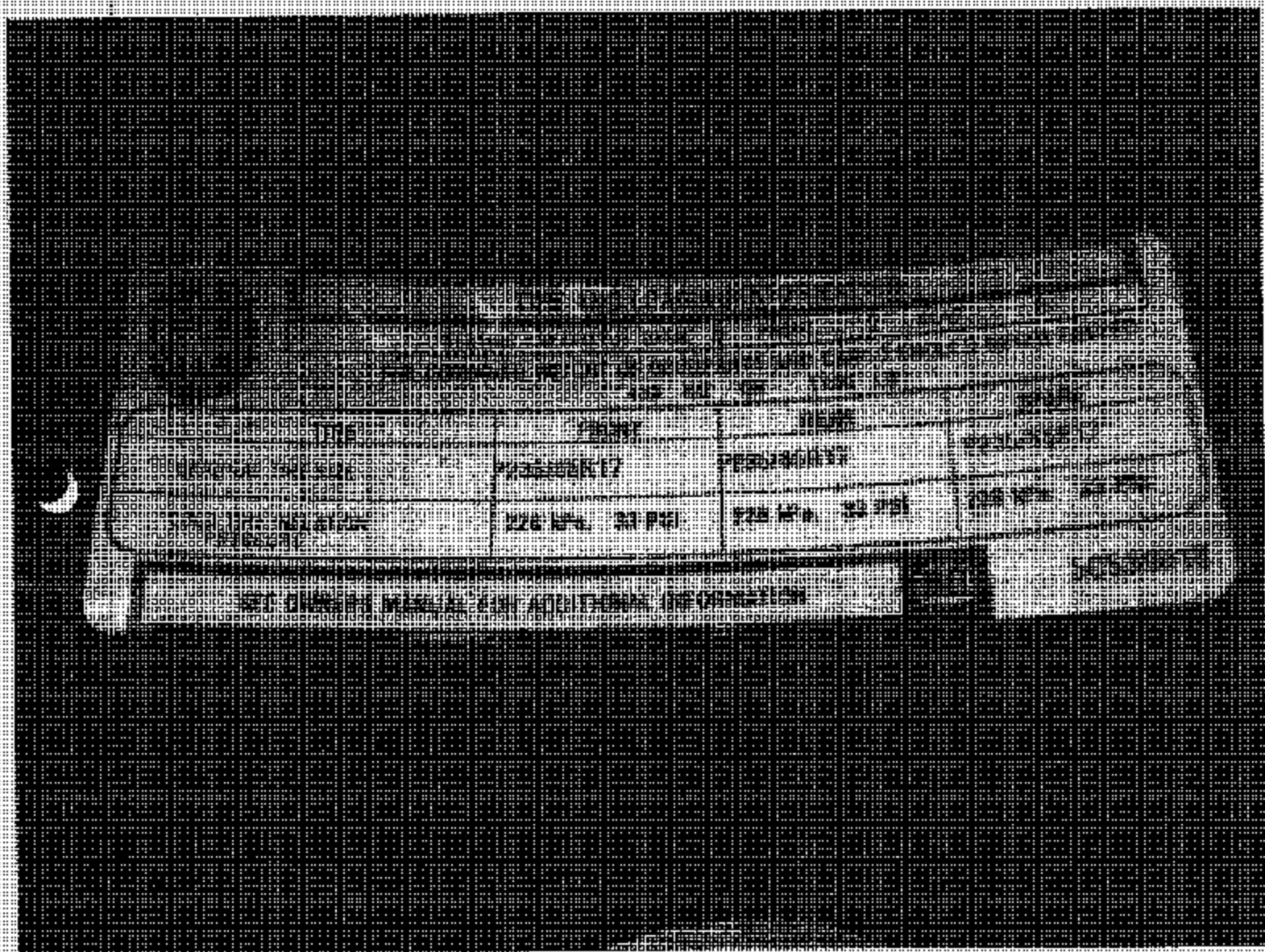
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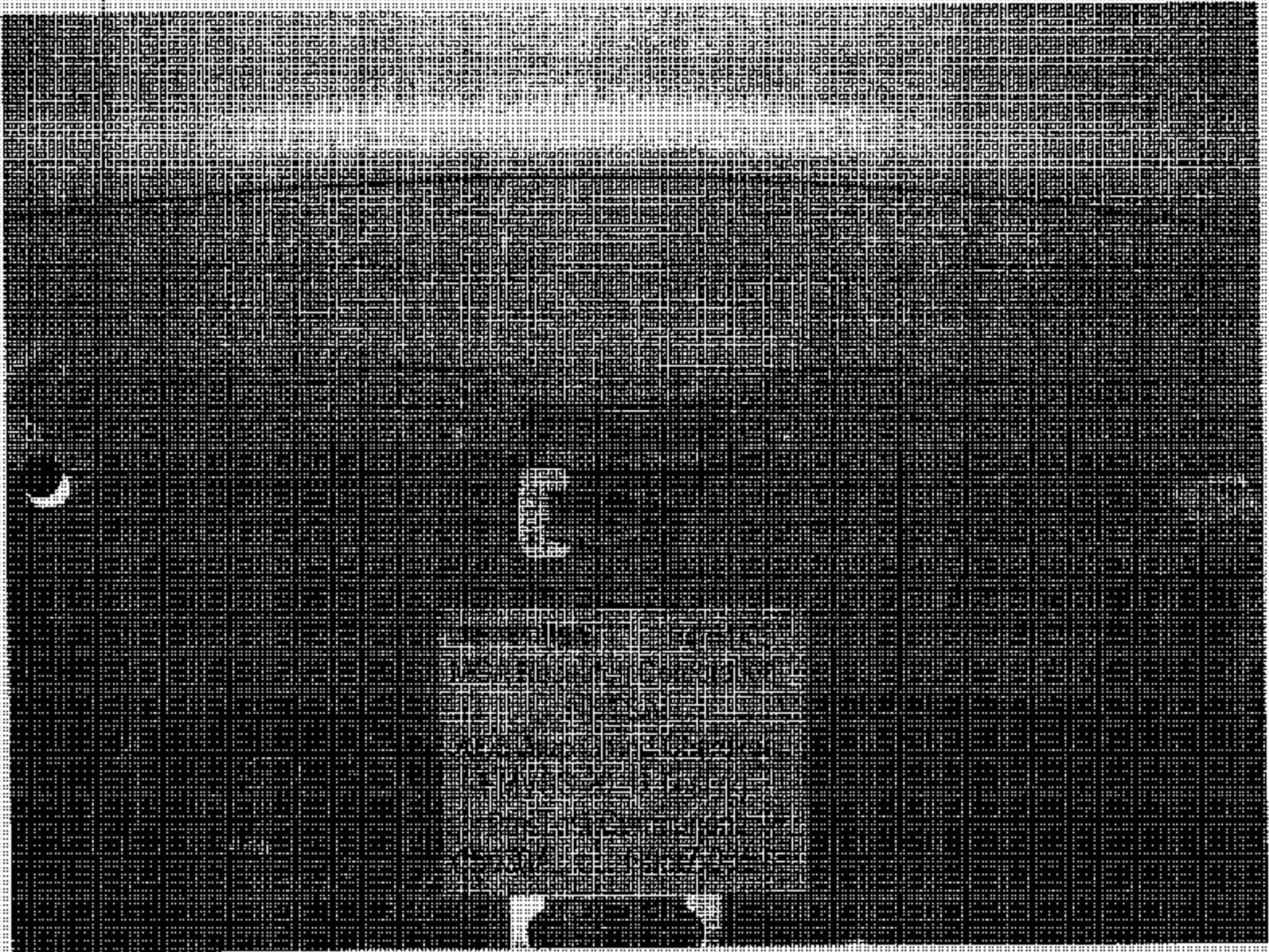
MCA RESEARCH CORP
2005 JEFFERSON GRAND CHERCHET

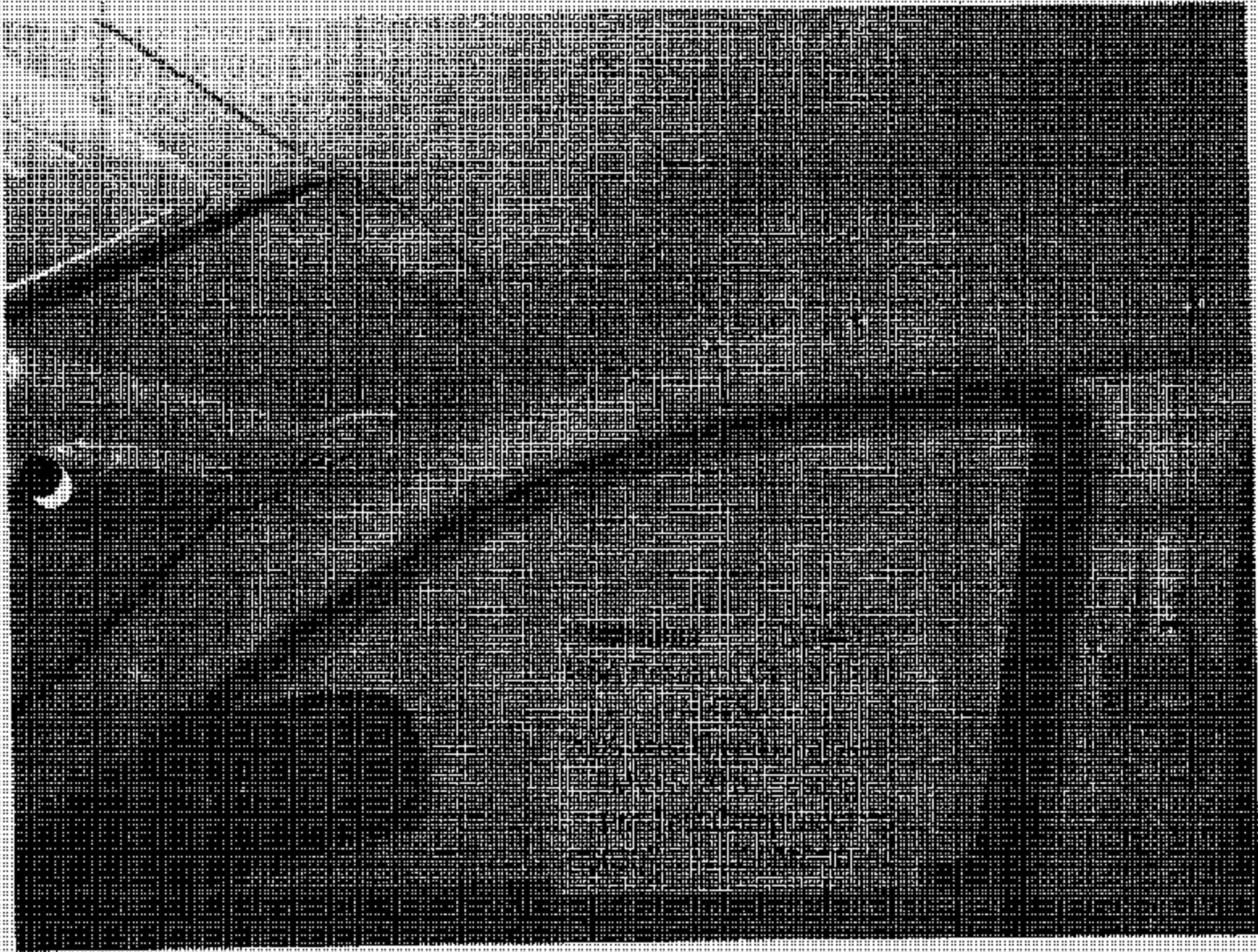
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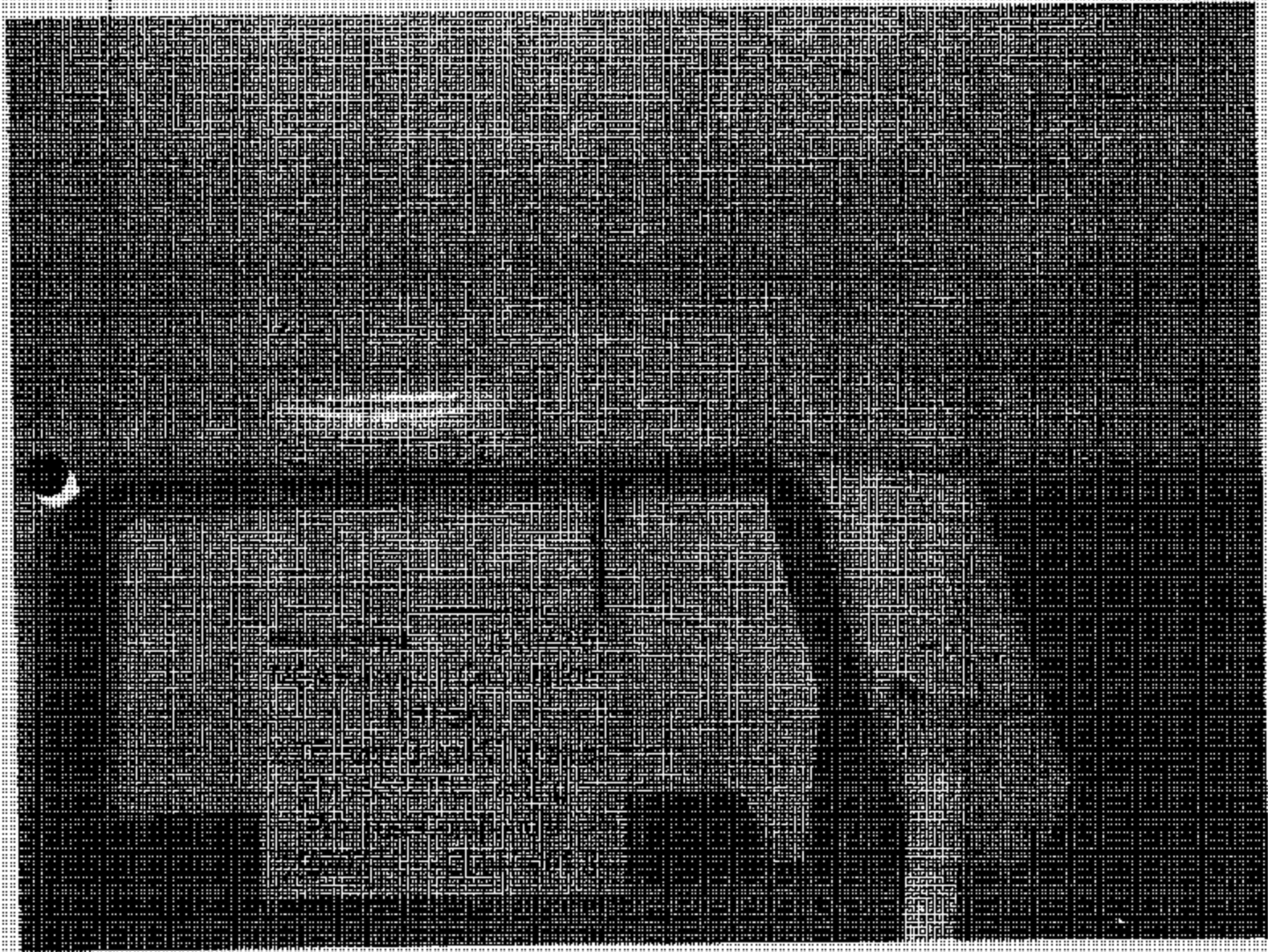
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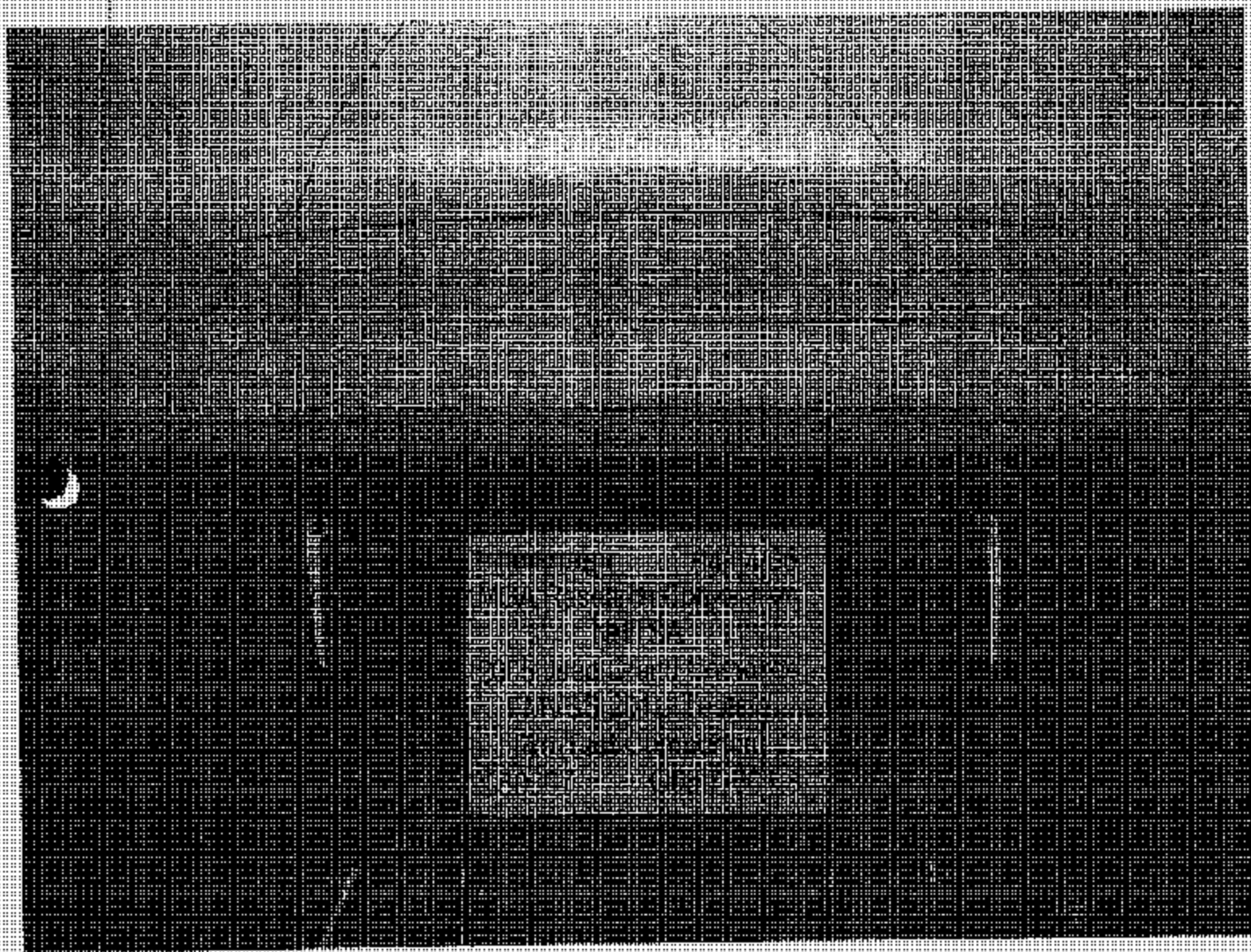
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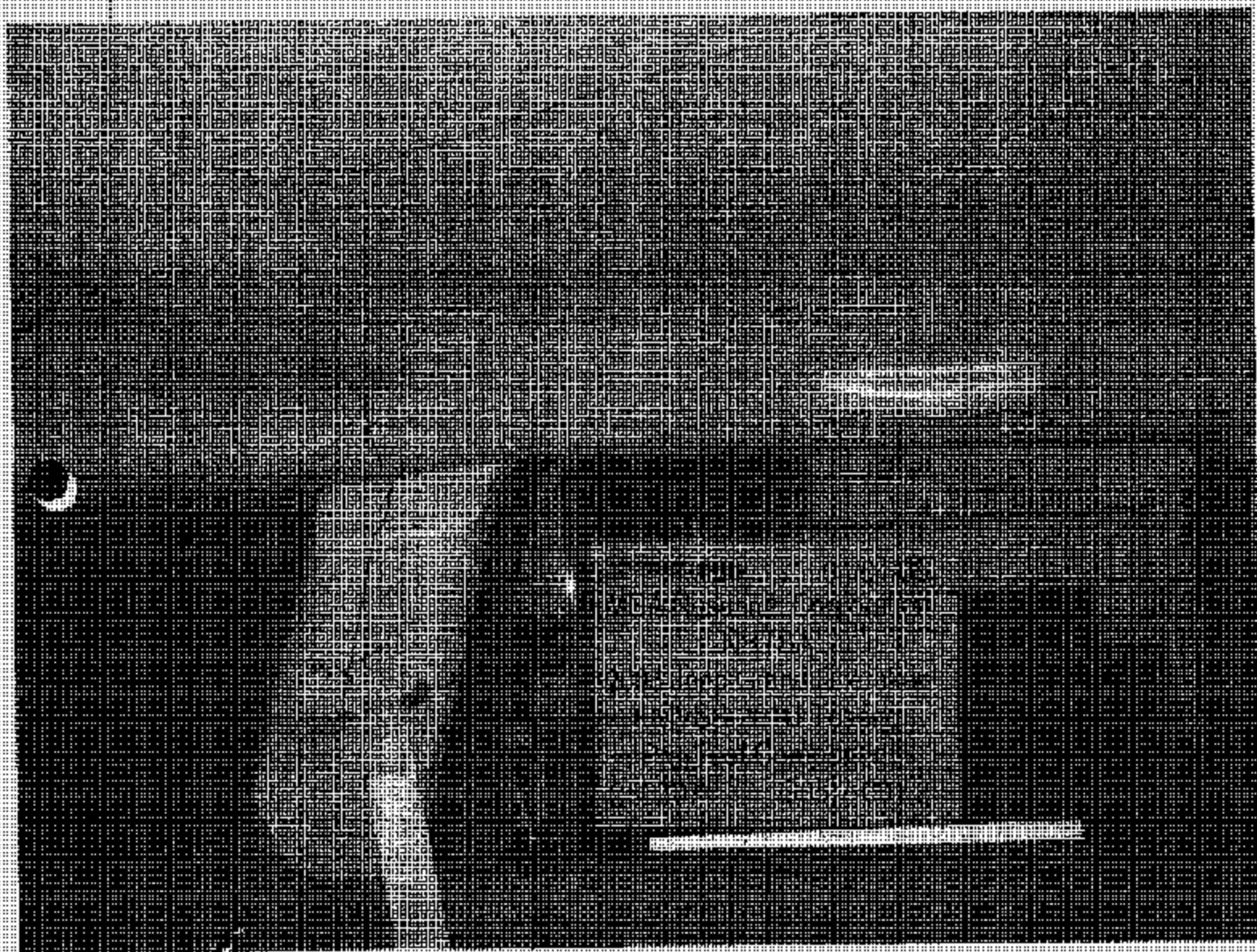


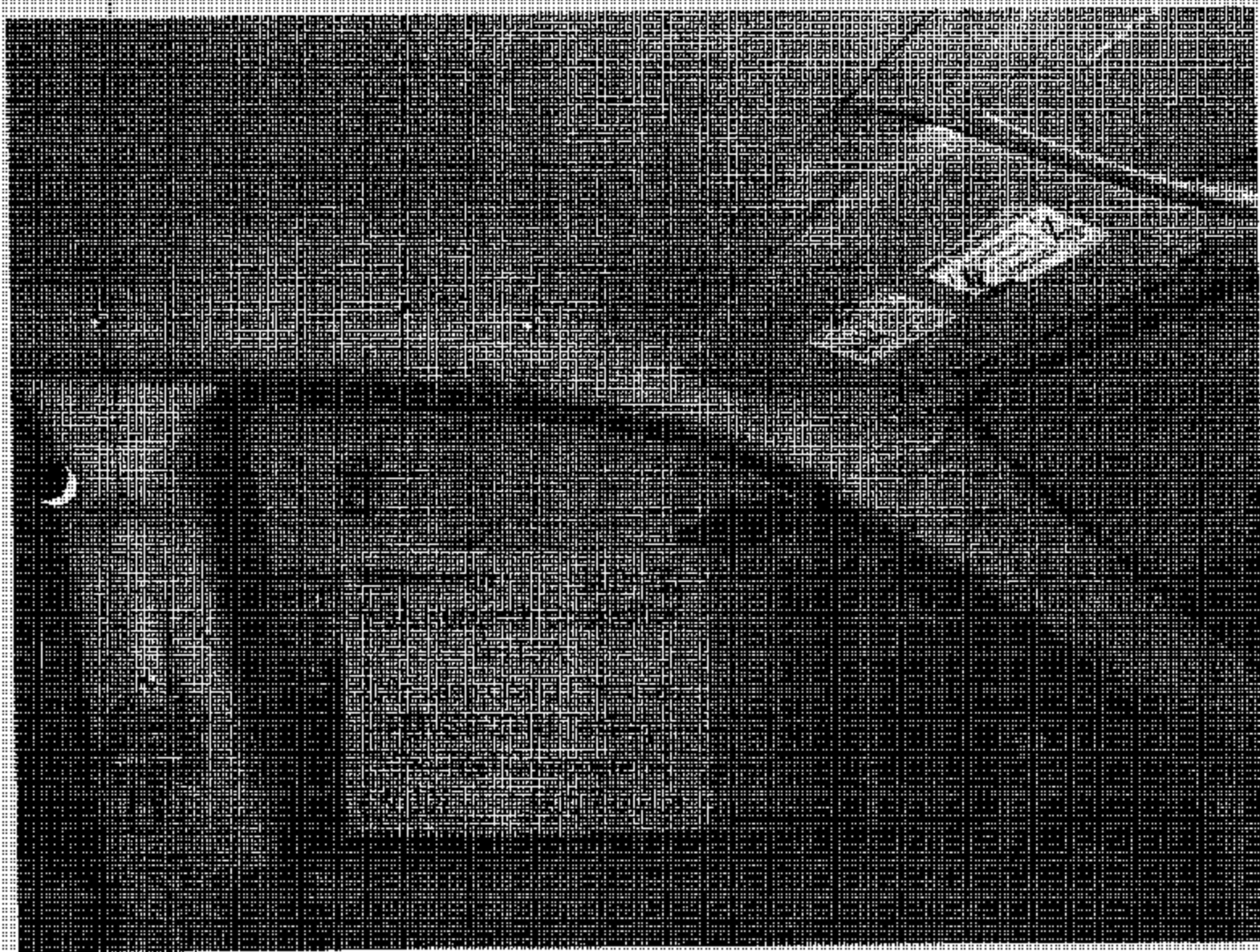


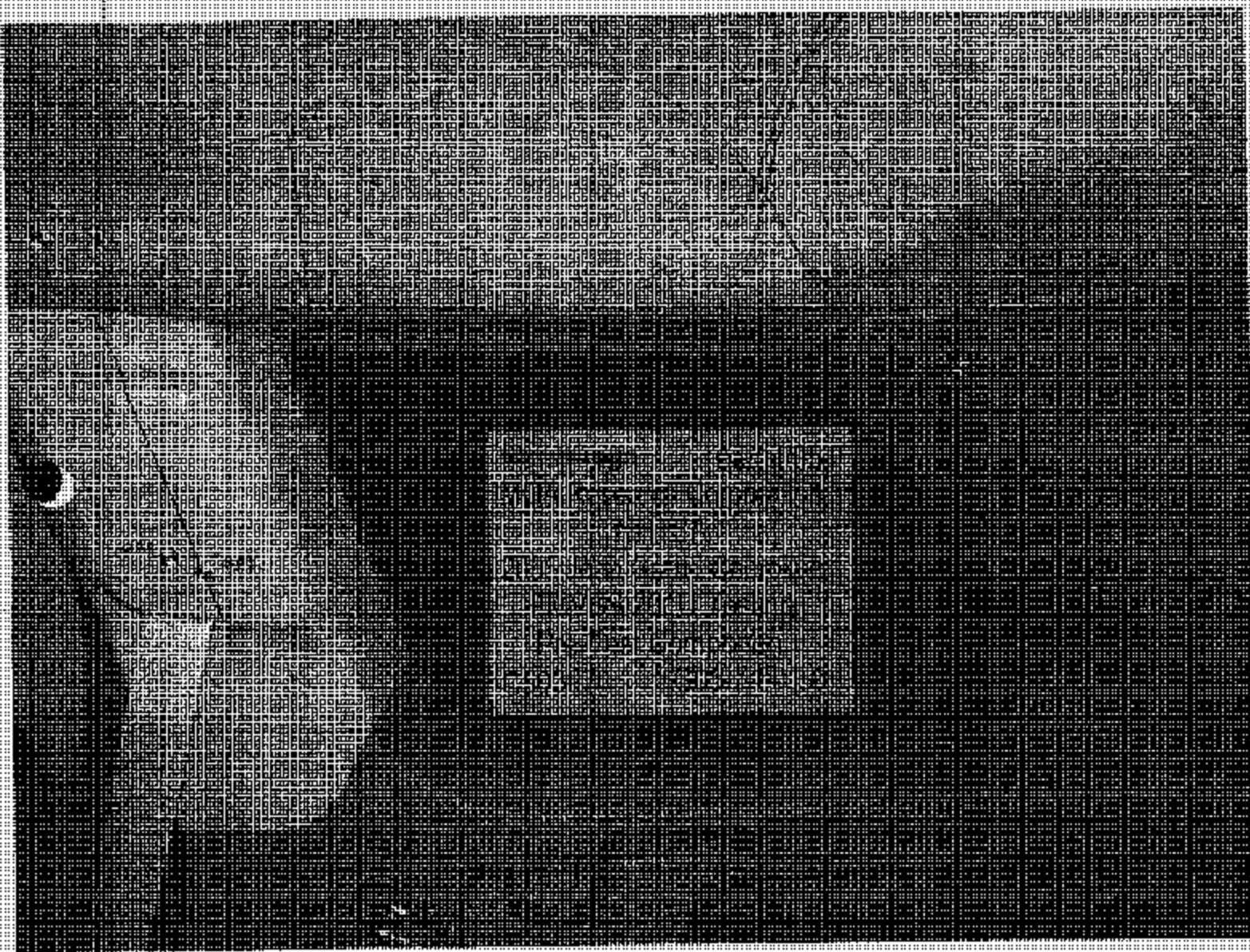


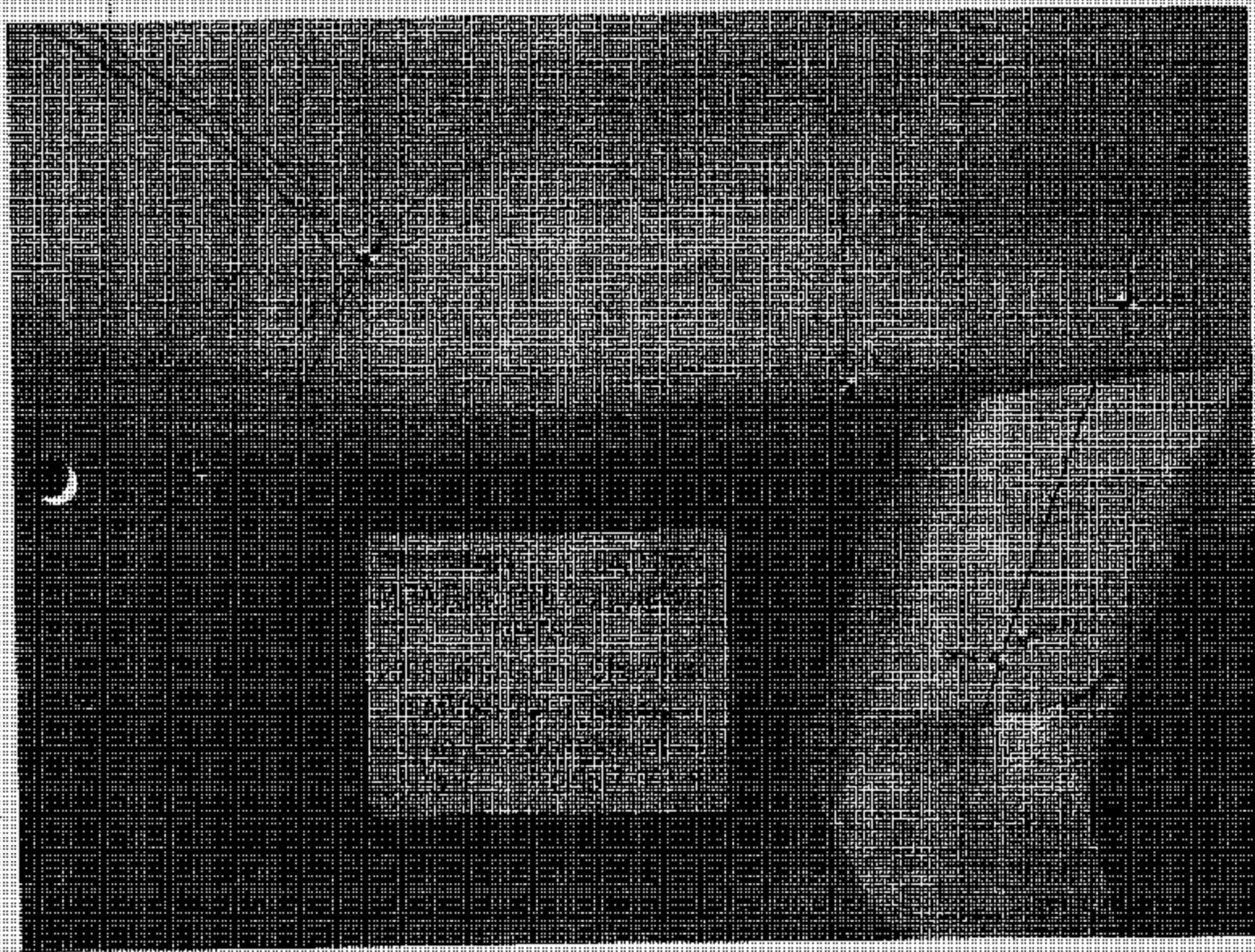




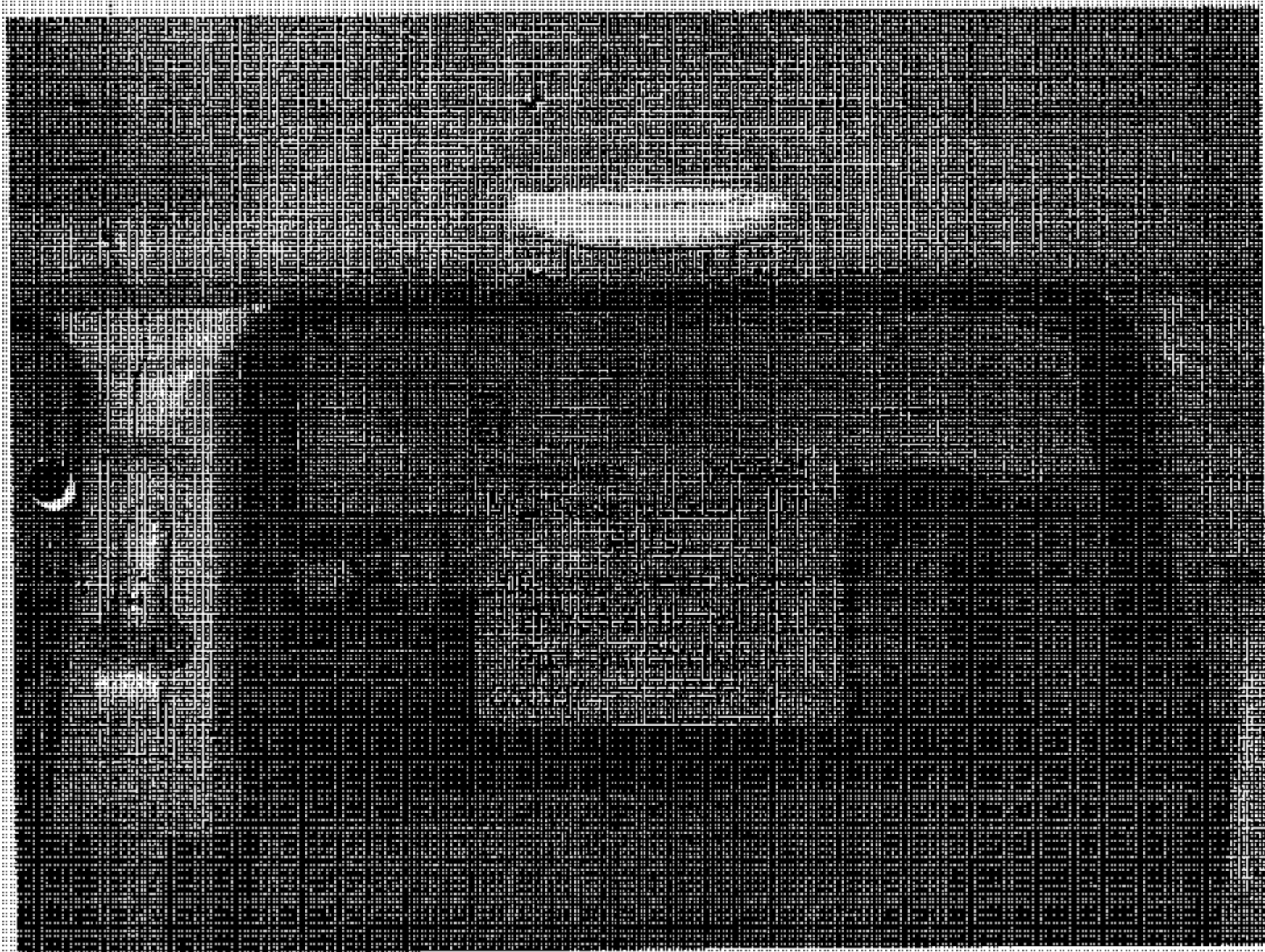


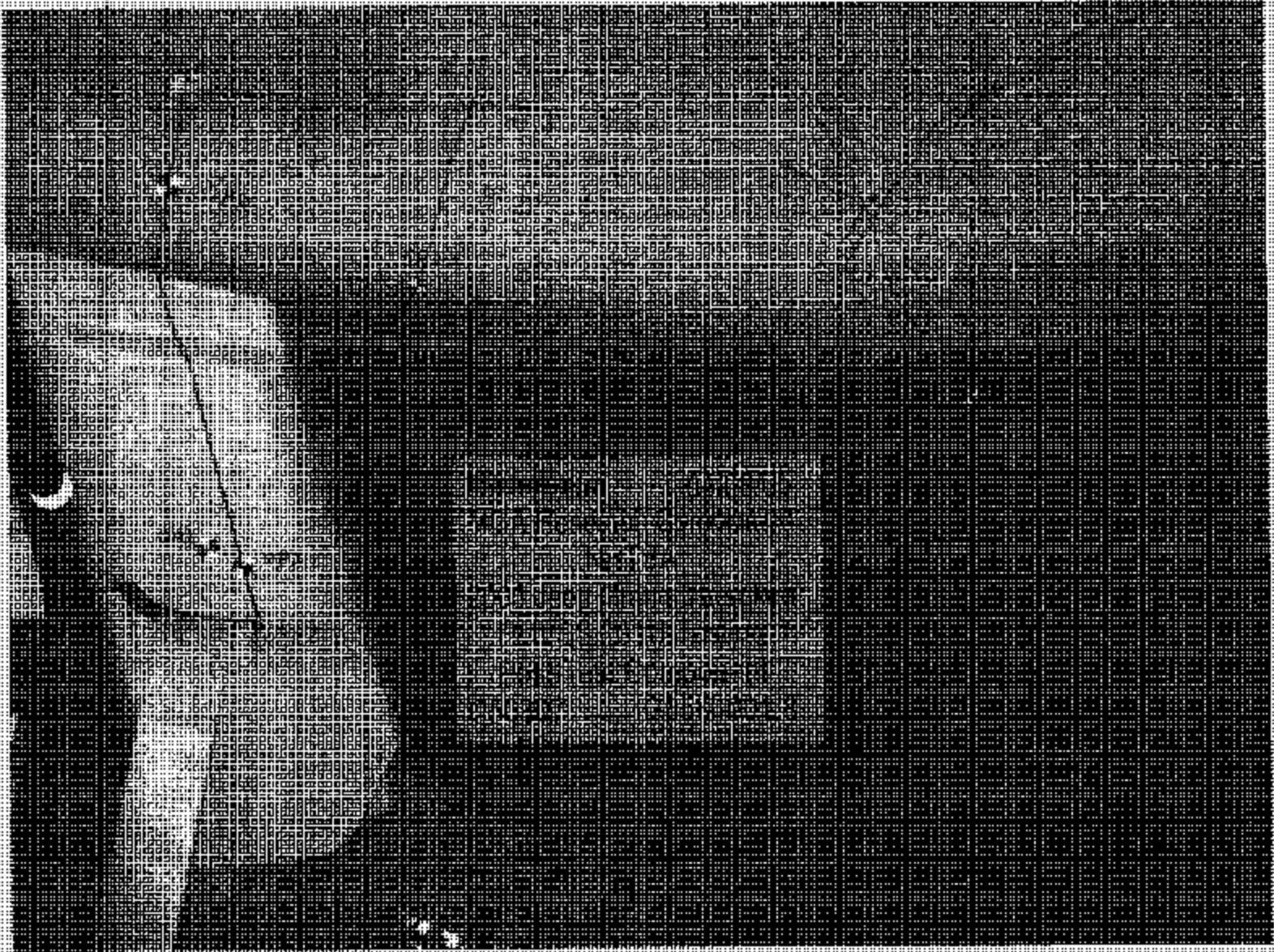


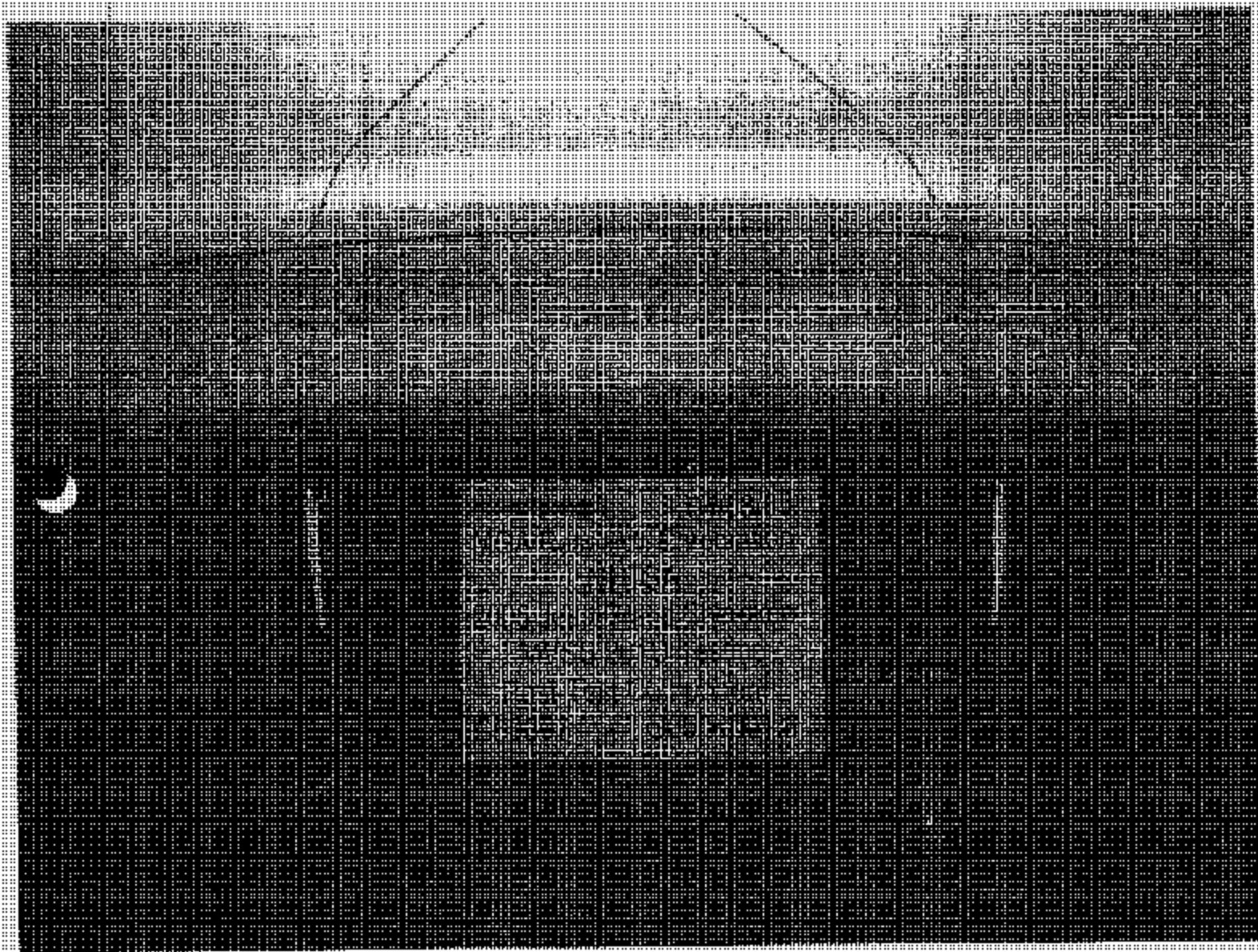


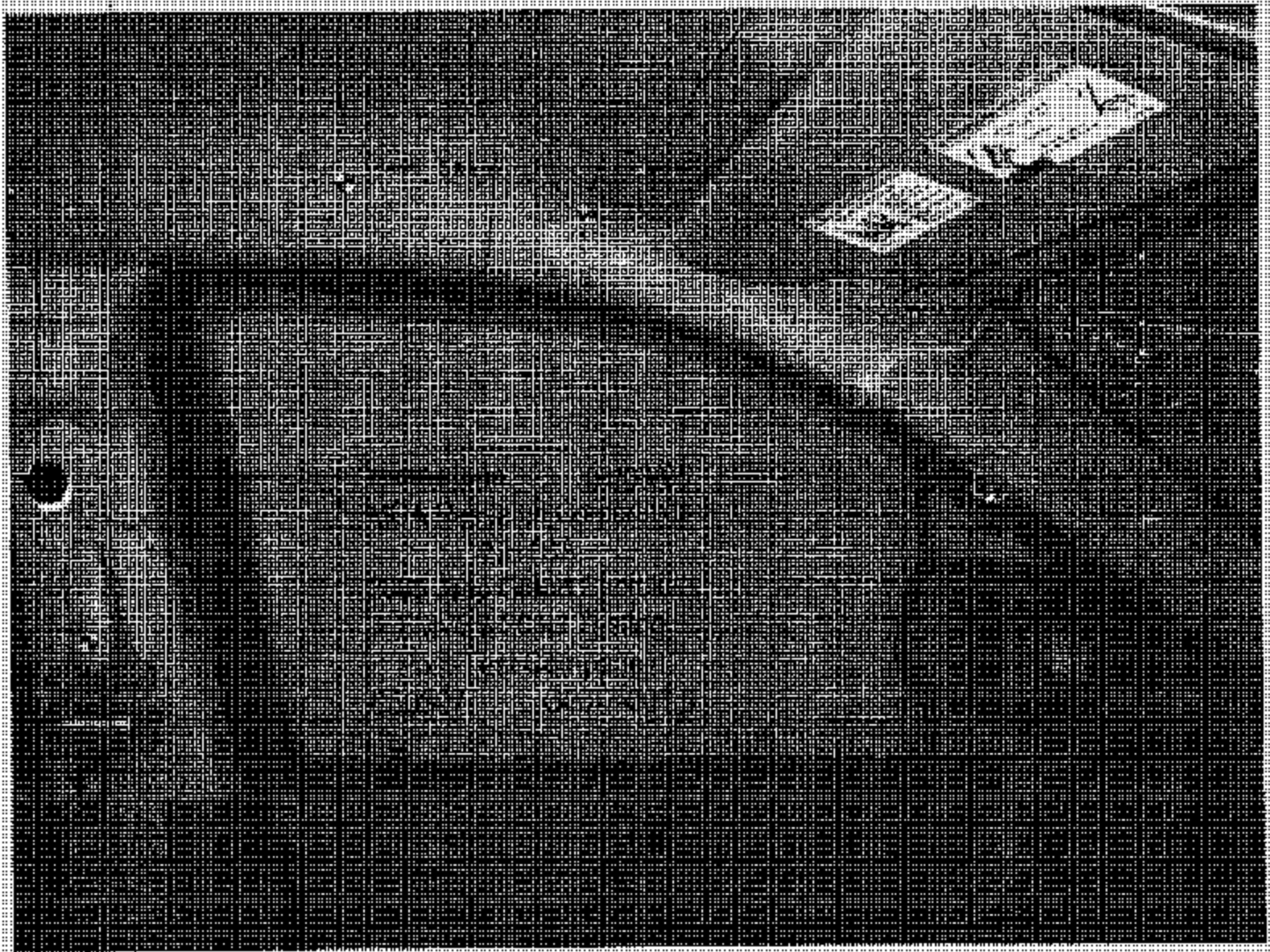


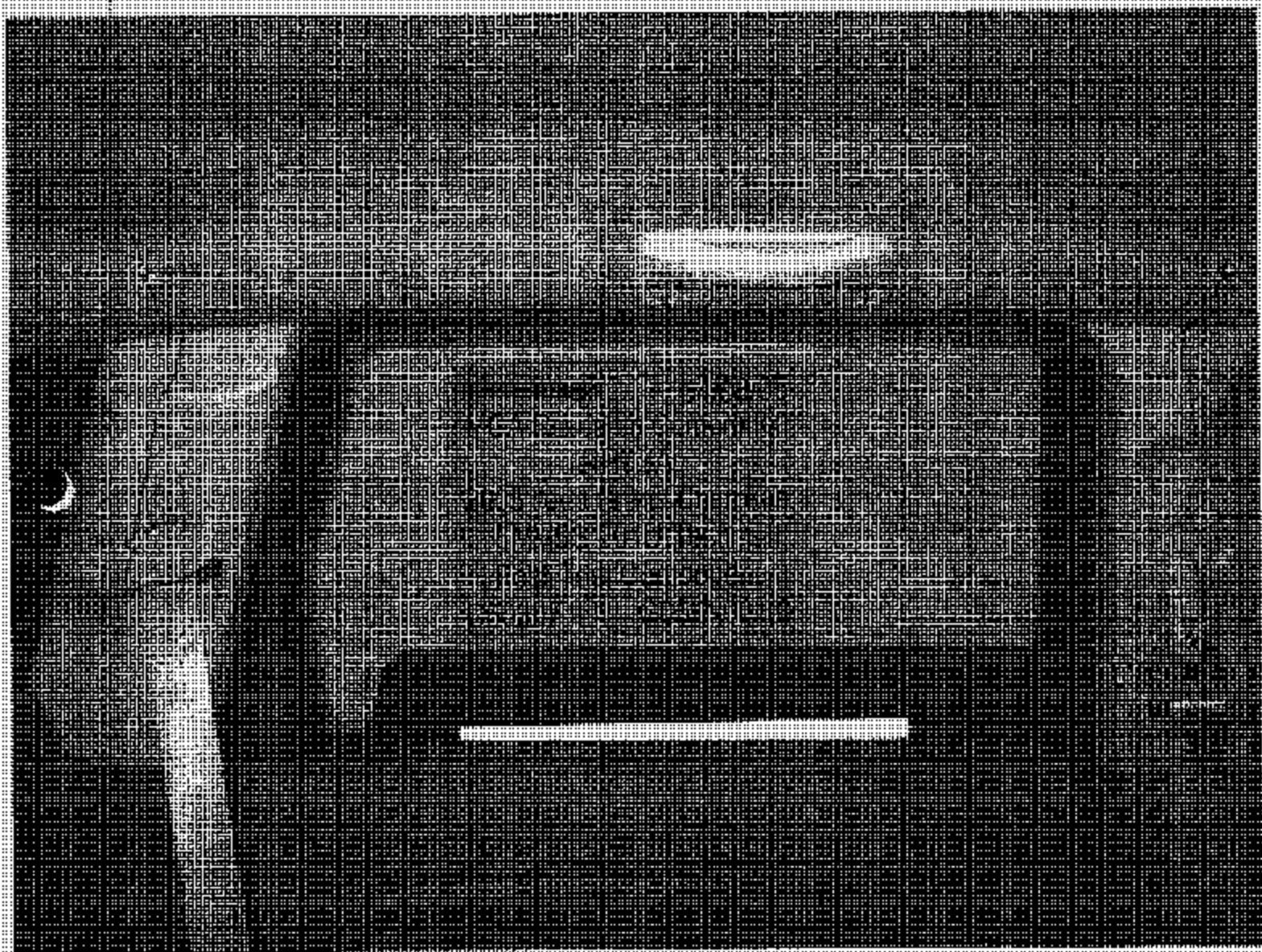


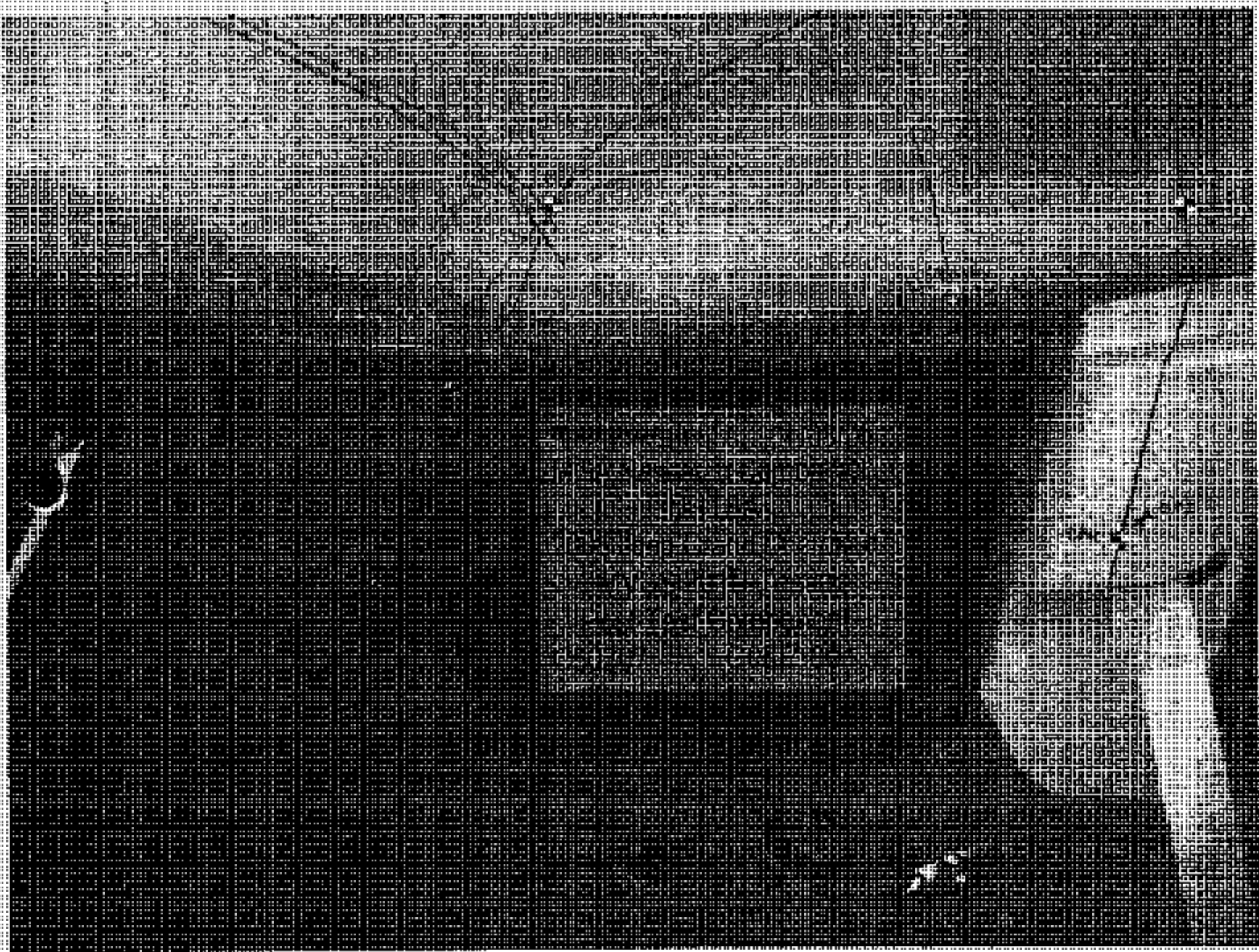


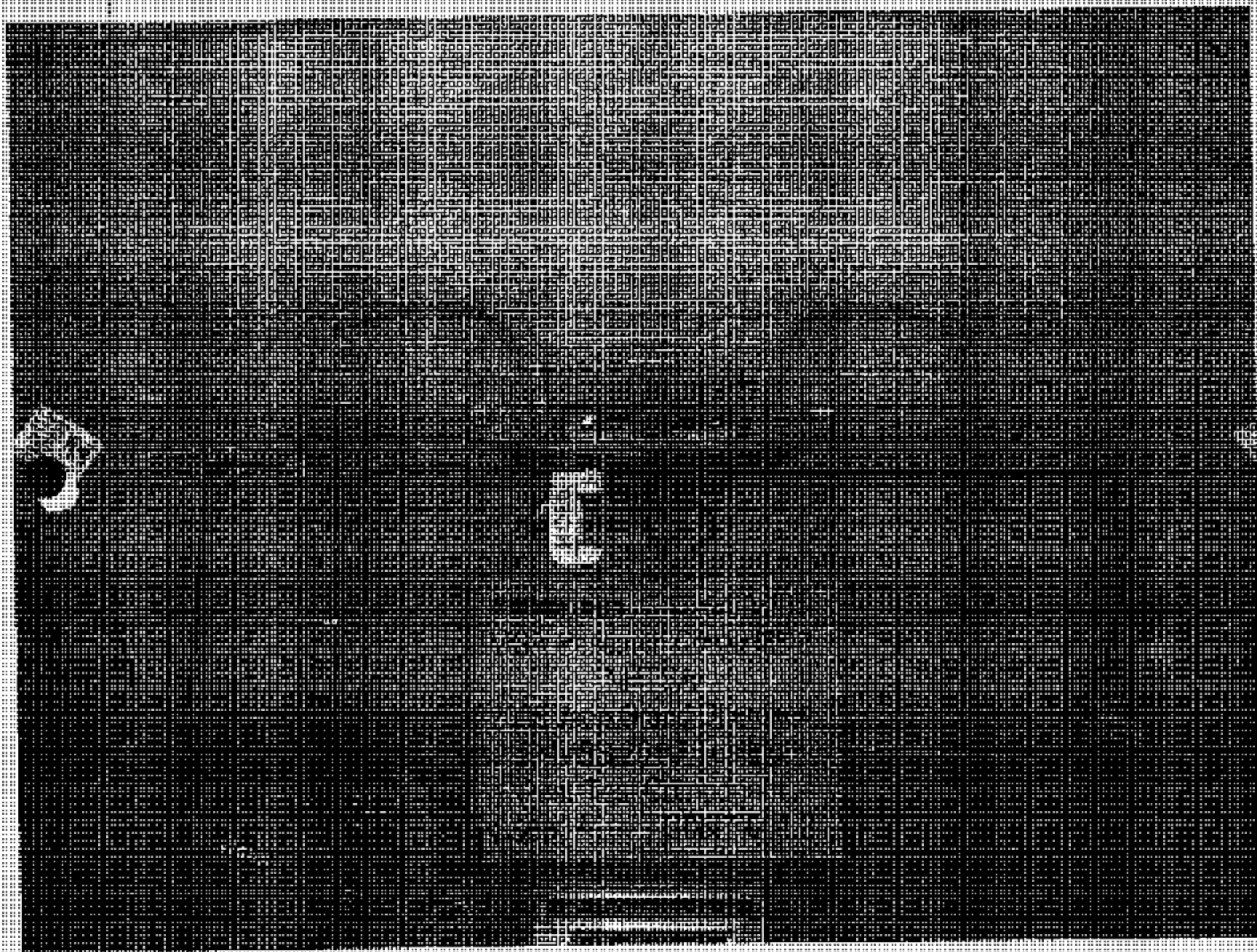












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04/08/05

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NHTSA

2005 Jeep Grand Cherokee

FMVSS 201U Testing

Post-Test Component

C50307

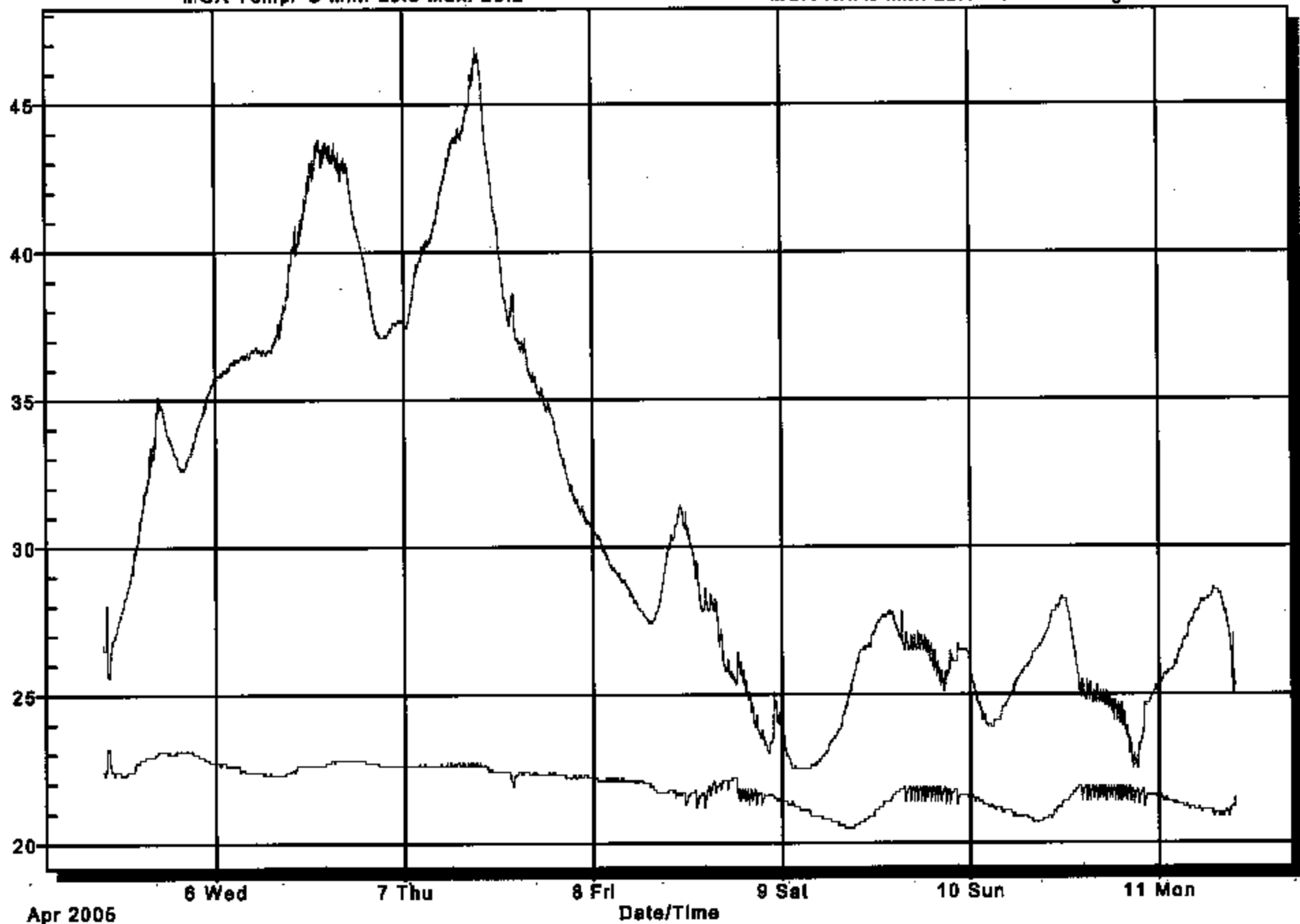
G0517-001.8

2005 JEEP GRAND CHEROKEE C50307

APRIL 5 - 11, 2005

MGA-Temp/°C Min: 20.5 Max: 23.2

MGA-RH/% Min: 22.5 Max: 46.9 Avg: 30.9





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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: Reference Accelerometer
Model: 7264-2000	Model: 301M09/484B
S/N: J35924	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 11/9/04	Calibration Date: 5/11/04
	Calibrated By: Chris Vega/PCB Piezotronics, Inc.

Test Reference Number: A0424

New DLR (100k , Units: G): 94.1

StdDeviation (%): 0.247

% Difference in DLR (New vs. Old): 1.899

Temperature (°F): 72

Humidity (%): 35

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.5\%$.
All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor $k=2$.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: <i>301M09/484B</i>
S/N: J35919	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 11/9/04	Calibration Date: <i>5/11/04</i>
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0424

New DLR (100k , Units: G): 94.3

StdDeviation (%): 0.198

% Difference in DLR (New vs. Old): 0.447

Temperature (°F): 72

Humidity (%): 35

Performed By:

A handwritten signature in black ink, appearing to read 'Chris Vega'.

Approved By:

A handwritten signature in black ink, appearing to read 'Heena Kalita'.

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.5\%$.
 All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.



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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: 301M09/484B
S/N: J22664	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 11/9/04	Calibration Date: 5/11/04
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0424

New DLR (100k, Units: G): 92.7

StdDeviation (%): 0.495

% Difference in DLR (New vs. Old): 0.224

Temperature (°F): 72

Humidity (%): 35

Performed By:



Approved By:



All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties
expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: 301M09/484B
S/N: J35800	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 11/9/04	Calibration Date: 5/11/04
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0422

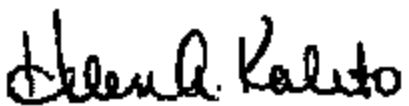
New DLR (100k , Units: G): 98.4

StdDeviation (%): 0.266

% Difference in DLR (New vs. Old): -0.586

Temperature (°F): 72

Humidity (%): 24

Performed By: Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
 All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties
 expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: <i>301M09/484B</i>
S/N: J35841	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 11/9/04	Calibration Date: <i>5/11/04</i>
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0422

New DLR (100k, Units: G): 92.6

StdDeviation (%): 0.092

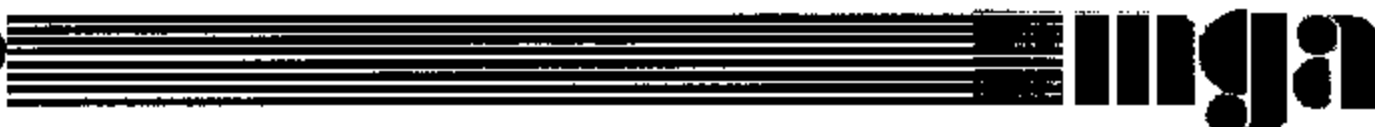
% Difference in DLR (New vs. Old): -0.35

Temperature (°F): 72

Humidity (%): 24

Performed By: Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
 All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties
 expressed at approximately the 95% confidence level using a coverage factor k=2.



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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: 301M09/484B
S/N: J35791	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 11/9/04	Calibration Date: 5/11/04
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0422

New DLR (100k , Units: G): 88.8

StdDeviation (%): 0.323

% Difference in DLR (New vs. Old): -0.776

Temperature (°F): 72

Humidity (%): 24

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.5\%$.
All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: <i>301M09/484B</i>
S/N: J36197	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 11/9/04	Calibration Date: <i>5/11/04</i>
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0423

New DLR (100k, Units: G): 110.0

StdDeviation (%): 0.117

% Difference in DLR (New vs. Old): 1.822

Temperature (°F): 72

Humidity (%): 32

Performed By:



Approved By:

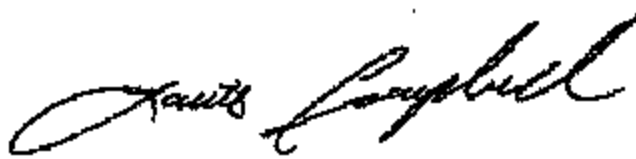


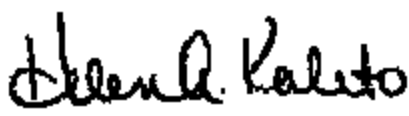
All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 0.8\%$.
 All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties
 expressed at approximately the 95% confidence level using a coverage factor k=2.

mga research corporation
CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: 301M09/484B
S/N: J36193	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 11/9/04	Calibration Date: 5/11/04
	Calibrated By: <i>Chrls Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0423
 New DLR (100k, Units: G): 101.9
 StdDeviation (%): 0.206
 % Difference in DLR (New vs. Old): 0.497
 Temperature (°F): 72
 Humidity (%): 32

 Performed By:
 

 Approved By:
 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.5\%$.
 All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor $k=2$.



mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7264-2000	Model: <i>301M09/484B</i>
S/N: J36353	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 11/9/04	Calibration Date: <i>5/11/04</i>
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0423

New DLR (100k , Units: G): 96.7

StdDeviation (%): 0.158

% Difference in DLR (New vs. Old): -0.171

Temperature (°F): 72

Humidity (%): 32

Performed By:



Approved By:



All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

~Certificate of Calibration~

Model Number: 404B	NLS.T. Project #: 0720012
Serial Number: 2470	Calibration Date: 06/11/2004
Description: Signal Conditioner	Recalibration Date:
Test Procedure: AT-106-1	Calibration Technician: Chris Vega CM #36
Temperature: 74° F	Relative Humidity: 42%

<u>TESTS</u>	<u>BEFORE</u>	<u>AFTER</u>
INPUT VOLTAGE ($24 \pm 0.1V$)	24.02	24.02
ICP CURRENT ($4 \pm 0.6mA$)	3.97	3.97
DC OFFSET A.C. MODE (volts)	-.001	-.001
GAIN (REF 1 VRMS, 1kHz)	1.0000	NOT ADJUSTABLE
DRIFT (DC MODE)	<2mV/min.	NOT ADJUSTABLE
FREQUENCY RESPONSE 10 Vp-p, 1 kHz REFERENCE	FLAT TO 200kHz	NOT ADJUSTABLE

As Received: In tolerance

As Left: In tolerance

Special Notes: MGA Research

This document certifies that the equipment referenced above meets published specifications. The calibration procedure is in compliance with ISO 19012-1, and former MIL-STD-40622A and is traceable to NIST. *Measurement uncertainty (95% confidence level w/coverage factor of 2) for scale factors is $\pm 0.2\%$.

This certificate may not be reproduced, except in full, without written approval of

~ Calibration Certificate ~

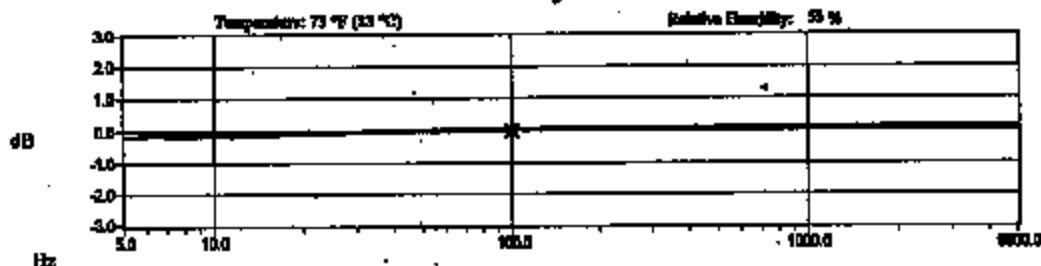
Per ISO 15002-01

Model Number: 301MB9/484B (30-4M17 SYSTEM)Serial Number: 062/2470Description: ICP® AccelerometerMethod: Back-to-Back Comparisons CalibrationManufacturer: PCB

Calibration Data

Sensitivity @ 100.0 Hz 31.17 mV/g Output Bias 0.6 VDC
 (3.179 mV/ms/s²) Transverse Sensitivity 3.0 %

Sensitivity



Data Points

Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)
5.0	-2.3	REF. FREQ.	0.0	5000.0	1.1
10.0	-1.9	300.0	0.7		
15.0	-1.4	500.0	0.8		
30.0	-0.6	1000.0	1.0		
50.0	-0.2	3000.0	1.1		

Mounting Surface: Submounted with 1mm Thick Epoxy Mounting Method: Vertical
 Acceleration Level (g): 100 g (9.81 m/s²)
 The acceleration level may be scaled by either displacement or force. When scaled, the resulting values should be indicated by the calibration system. The acceleration level (g) is indicated by the calibration system. The acceleration level (g) is indicated by the calibration system. The acceleration level (g) is indicated by the calibration system.

Condition of Unit

As Found: In Tolerance, No Adjustment NecessaryAs Left: In Tolerance

Notes

1. Calibration is NIST Traceable thru Project 222/187400 and PTB Traceable thru Project 1855.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%.

Technician: Chuck DiMaggio CTS Date: 05/15/04

Cert No 1000001

PCB PIEZOTRONICS

VIBRATION DIVISION

3425 Wadsworth Avenue Depew, NY 14643
 TEL: 716-684-8913 FAX: 716-684-8116 www.pcb.com

Form 1 of 1

REV. 10/00/01

Interim Certification Document

Part Description: **Silver**

Serial Number: **S08059801273**

Single Point 2Sigma: **S08-05 +/-0.078mm (+/-0.0030")**

Linear Displacement 2 Sigma: **S08-06 +/-1.108mm (+/-0.042")**

Certification Date: **August 26, 2004**

Measurement Standards, N.I.S.T., U.K.A.S. TRACEABILITY

Bal-Tec Invar Ball Bar Kit	Kit Number: 548	N.I.S.T. Cert No.: LL0101A0310	Date: 08/18/04
		U.K.A.S. Cert No.: LL0101A0310	Date: 08/18/04
"The Ball Bar Kit above has been calibrated against a laser interferometer traceable to NIST and UKAS standards (see test numbers above)."			
Mitutoyo Corporation, 10mm Step Gauge,	Code NPL: 915-744,	Serial Number: 410101	N.I.S.T. Control No.: 110107228
Measuring Range: 1.5m			U.K.A.S. Cert No.: 150674
			Date: 04/08/04
			Date: 02/25/04

Certification Results

A basic 4 quadrant certification included with all Faro Arms and compromised of: 2 vertical level single point repeatability test: **PASSED**
in 4 quadrants with 5 repeats from 4 directions.

Step gauge test in 4 quadrants 3 orientation per quadrant. **PASSED**

3 Length, 3 position free ball bar test in 4 quadrants. **PASSED**

This instrument as received was within specification.

Ambient Temperature: 22°C +/- 3°C

Technician:

Patrick Newell
Patrick Newell

Date: *8/26/04*
8/26/2004

This certificate shall not be reproduced, except in full
without the written permission of Faro Technologies, Inc.

The results of this certificate relate only to the items calibrated or tested.

FARO

Printed August 18, 2004

Faro Technologies, Inc.
PH: (407)833-0511

125 Technology Park
1-800-790-4771

Lake Mary, FL 32746
FAX: (407)333-3058

MICHIGAN OPERATIONS
DATE: 3/2/03
SUPERCEDES: MQATPTMC.3

DOC. NO.: MQATPTMC
REVISION NO.: 4
PAGE 3 OF 3

Tape Measure Calibration Certificate

Reference Steel Rule

Brand: LEE
S/N: 618033
Calibration Date: 11.24.03

Subject Tape Measure

Brand: STANLEY
S/N: 725
Calibration Date: 3.8.04

Reference mm	Subject Tape Measure	Difference	Reference mm	Subject Tape Measure	Difference
0	0	0	450	450	0
25	25	0	475	475	0
50	50	0	500	500	0
75	75	0	525	525	0
100	100	0	550	550	0
125	125	0	575	575	0
150	150	0	600	600	0
175	175	0	625	625	0
200	200	0	650	650	0
225	225	0	675	675	0
250	250	0	700	700	0
275	275	0	725	725	0
300	300	0	750	750	0
325	325	0	775	775	0
350	350	0	800	800	0
375	375	0	825	825	0
400	400	0	850	850	0
425	425	0	875	875	0

If all differences are ± 1 mm, then the tape measure is acceptable.

Pass X Fail Maximum Difference = 0

Date: 3.8.04

Performed By: RJ Mikh



Certificate Number: 20040203Cal

Detroit Testing Laboratory, Inc.



7111 E. 11 Mile Road, Warren, MI 48092-8708 • (586) 754-8000 • FAX (586) 754-8045 • www.dtl-inc.com

Certificate of Calibration

Equipment Information

Customer: MGA Research Corporation
446 Executive Drive
Troy, MI 48063

Model: Pro 360
Serial Number: NONE
Manufacturer: Mitutoyo
Description: Protractor

System ID: MGA00071

Customer Asset No.: MGA00071 (018904)

Calibration Information

Calibration Date: 1/29/04
Calibration Due: 1/29/05
Calibration Interval: 12 Month
Rec'd In To: Yes/Pass
Returned In To: Yes/Pass
Performed On Site: No

Procedure Used: 33K6-4-1597-1/99
Calibrated to: MPR SPEC
Temperature: 20 °C
Humidity: 29 %RH

Calibration Limitations:

The Uncertainty of the Measurements Pertaining to This Calibration are Estimated to be: Various

¹ Pass/Fail or In/Out of Tolerance statements are opinions only of the person performing the calibration, based on data from measurements at the time they were made, procedure utilized, professional experience, and the uncertainty associated with this calibration. It is ultimately up to the user of this equipment to determine if this item meets their specific requirements for accuracy for its intended application.

Calibration Standards Used

System ID:	Model:	Serial:	Manufacturer	Description:	Date Due:
09098	CT485B	61201094	Omega	Thermocouple	7/28/04
07748	2 X 2'	13028	TRU-STONE	Granite Surface Plate	2/19/04
10493	SP-66-S1	9902	Suburban Tool, Inc.	Sine Plate	2/17/06
09156	CHALLENGER 81 P	09156	AA JANSSON	Gage Blocks	3/5/04

Any calibration interval and due date of this device, if used, is at the request of the customer. Due to the fact that many variables may affect drift of reported values over time there is no assurance implied that this item will maintain its stated accuracy through the end of this interval.

This Calibration has been performed per requirements of ISO 17025:1999. Reported results are from standards with accuracies that are traceable to the International System of Units (SI), derived from physical constants, ratio measurements, national measurement standards, or compared to commercial standards. Measurement uncertainty is expressed as a confidence level of approximately 95% (coverage factor k=2).

Signature: <u>Paul Wonsowicz</u> Paul Wonsowicz Technician	Date: 1-29-04	Signature: <u>[Signature]</u> Date: 1/29/04
Date Printed: 01/29/04	Printed By: Paul Wonsowicz	Page 1 of 2

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Detroit Testing Laboratory, Inc.

CALIBRATION DATA SHEET

Date: 1/29/04
 DTL ID: MGA00071
 Cert. Number: 20040203Cal

Angle Measurement Calibration

Cal Point *Angle (std)	Reading As Found (uut) *Angle	Reading As Left (uut) *Angle	Deviation As Found *Angle	Deviation As Left *Angle	% of Allowed Dev as Found	% of Allowed Dev as Left
0.0	0.0	0.0	0.0	0.0	0.00	0.00
5.0	5.0	5.0	0.0	0.0	0.00	0.00
15.0	15.0	15.1	0.0	0.1	0.00	50.00
30.0	29.9	30.0	-0.1	0.0	-50.00	0.00
45.0	44.8	45.0	-0.2	0.0	-100.00	0.00
-5.0	-5.0	-5.0	0.0	0.0	0.00	0.00
-15.0	-15.1	-15.0	-0.1	0.0	-50.00	0.00
-30.0	-29.9	-30.0	0.1	0.0	50.00	0.00
-45.0	-45.0	-45.0	0.0	0.0	0.00	0.00

Alternate Reference and Hold Calibration

Cal Point *Angle (std)	Reading As Found (uut) *Angle	Reading As Left (uut) *Angle	Deviation As Found *Angle	Deviation As Left *Angle	% of Allowed Dev as Found	% of Allowed Dev as Left
-30.0	-30.0	-30.0	0.0	0.0	0.00	0.00
30.0	29.9	30.0	-0.1	0.0	-50.00	0.00
Hold Function	Pass	Pass				

Form: F410/12-3 Revision Date: 03-11-03
 Revision Level: E
 STANDARD FORM

20950 Boering St.
 Southfield MI 48075
 Phone (248) 358-0590 Fax (248) 355-2529

Sterling Scale Company Inc.
Scale Certificate of Calibration

Customer: MCA Research
 Location of Calibration: 446 Executive Dr.
Troy MI 48065
 Certification Number: 6774
 Date of Calibration: 8-11-2004
 **Next Calibration Due: 8-2005
 Environmental Condition: ☒ Good ☐ Fair ☐ Poor

Make:	Model:	Serial/ID#:	Capacity:
<u>S.W. Scales</u>	<u>SW Deluxe</u>	<u>26032389</u>	<u>8800x16</u>

This certifies that the above scale has been calibrated using the relevant EPO, original equipment manufacturer calibration procedures along with Handbook 44 tolerances using weights traceable to the National Institute of Standards and Technology as well as the International Systems of Units (SI).

Sterling Scale Weight/Weight kit serial #: 1160, 10002, 50967, 20600, 2015, 20150

Calibrated to class: III

Date Weight/Weight kit calibrated: 9/03

Date Weight/Weight kit due: 9/05

Expanded Uncertainty ($k=2$) confidence level of 95% is reported with the before and after readings on next page.

Temperature 72° Humidity 60%

Ps 1 of 3

These items relate only to these results

Tolerances followed are maintenance/acceptance per NIST-44

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** Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired.

The reported uncertainty is valid only for the environment in which it is determined.



1448.01

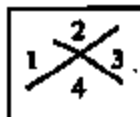
Form F410/12-3 Revision Date 03-11-03
Revision Level E
STANDARD FORM

20950 Boming St.
Southfield MI 48075
Phone (248) 358-0590 Fax (248) 353-0590

Sterling Scale Company Inc.
Scale Certificate of Calibration

Applied Test Weight	Before Adjustment	Tolerance +/-	In tolerance Y / N	After Adjustment	In tolerance Y / N	Expanded Uncertainty
50 lb	50 lb	1 lb	Y	50 lb	Y	-0.03 LB
1000 lb	1000 lb	2 lb	Y	1000 lb	Y	-0.4 LB
2200 lb	2200 lb	2 lb	Y	2200 lb	Y	-1.3
50 lb	50 lb	1 lb	Y	50 lb	Y	-0.03
1000 lb	1000 lb	2 lb	Y	1000 lb	Y	-0.6
2200 lb	2200 lb	2 lb	Y	2200 lb	Y	-1.3

Shift test.



N/A - Small pad

	1	2	3	4
Before Adj.				
After Adj.				

Scale condition as found: None

Tests performed: ☒ Repeatability ☒ Linearity ☐ Sensitivity ☒ Discrimination

☒ Scale Certified

☐ Scale Rejected

If scale is rejected, why?

Larry / Creny
Sterling Scale Service Rep.

Date: 8-11-04

as 2-4-3

These items relate only to these results.

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Tolerances followed are maintenance/acceptance per NIST-44

** Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired.



1448.01

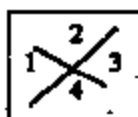
Form F410/12-3 Revision Date 03-11-03
Revision Level B
STANDARD FORM

20950 Boering St.
Southfield MI 48075
Phone (248) 358-0590 Fax (248) 358-0590

Sterling Scale Company Inc.
Scale Certificate of Calibration

Applied Test Weight	Before Adjustment	Tolerance +/-	In tolerance Y / N	After Adjustment	In tolerance Y / N	expected uncertainty
50 lb	50 lb	1 lb	Y	50 lb	Y	.003
1000 lb	1000 lb	2 lb	Y	1000 lb	Y	.06
2200 lb	2200 lb	2 lb	Y	2200 lb	Y	.13
50 lb	50 lb	1 lb	Y	50 lb	Y	.003
1000 lb	1000 lb	2 lb	Y	1000 lb	Y	.06
2200 lb	2200 lb	2 lb	Y	2200 lb	Y	.13

Shift test.



N/A - Small load

	1	2	3	4
Before Adj.				
After Adj.				

Scale condition as found: New

Tests performed: ☒ Repeatability ☒ Linearity ☐ Sensitivity ☒ Discrimination

☒ Scale Certified

☐ Scale Rejected

If scale is rejected, why?

Larry / Mary
Sterling Scale Service Rep.

Date: 8-11-04

vs. 3-3

These items relate only to these results.

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Tolerances followed are NIST acceptance per NIST-44

** Any number of factors may cause the calibration team to drift out of calibration before the recommended interval has expired.



1448.07



Certificate Number: 20042087Cal

Detroit Testing Laboratory, Inc.



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Certificate of Calibration

Equipment Information

Customer: MGA Research Corporation
446 Executive Drive
Troy, MI 48063

Model: SC4010
Serial Number: BJ451855
Manufacturer: Ohaus
Description: Scale

System ID: MGA00045

Customer Asset No.:

Calibration Information

Calibration Date: 8/15/2004
Calibration Due: 8/15/2005
Calibration Interval: 12 Month
Rec'd In Tel: Yes/Pass
Returned In Tel: Yes/Pass
Performed On Site: No

Procedure Used: 33K6-4-3000-1/P8
Calibrated to: MFR SPBC
Temperature: 23 °C
Humidity: 44 %RH

Calibration Limitation:

The Uncertainty of the Measurements Pertaining to This Calibration are Estimated to be: 0.055 g + 0.01% Ind.

Pass/Fail or In/Out of Tolerance statements are opinions only of the person performing the calibration based on data from measurements at the time they were made, procedure utilized, professional experience, and the uncertainty associated with this calibration. It is ultimately up to the user of this equipment to determine if this item meets their specific requirements for accuracy for

Calibration Standards Used

System ID:	Model:	Serial:	Manufacturer:	Description:	Date Due:
09126	CT485B	612010507	OMEGA	Thermocouloidgraph	5/10/2005
07270	1mg-1kg	QA-1000	TRCEMINER	WEIGHT SET	10/6/2005

Any calibration interval and due date of this device, if stated, is at the request of the customer. Due to the fact that many variables may effect shift of reported values over time there is no assurance implied that this item will maintain its stated accuracy through the end of this interval.

This Calibration has been performed per requirements of ISO 17025-1999. Reported results are from standards with uncertainties that are traceable to the International System of Units (SI), derived from physical constants, or to measurements, national measurement standards, or certified to recognized standards. Measurement uncertainty is expressed at a confidence level of approximately 95% (coverage factor

Signature: <i>Robert West</i> Rob West Technician	Date: 8-25-04	Approved: <i>Paul W.</i> Paul W. Date: 8-25-04
Date Printed: 08/18/04	Printed By: Robert West	Page: 1 of 2
QFC 1043-1 Rev 4/17/03		

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Detroit Testing Laboratory, Inc.

CALIBRATION DATA SHEET

Date: 8/16/2004
 DTL I.D: MGA00046
 Cert No. 20042087Cal

Cal Point grams		Reading As Found grams	Reading As Left grams	Deviation As Found grams	Deviation As Left grams	% of Allowed Dev as Found	% of Allowed Dev as Left
old		nut	nut				
10.00		10.0	10.0	0.0	0.0	0.00	0.00
100.00		100.0	100.0	0.0	0.0	0.00	0.00
200.00	(plate level)	200.0	200.0	0.0	0.0	0.00	0.00
200.00	LP	200.0	200.0	0.0	0.0	0.00	0.00
200.00	RF	200.0	200.0	0.0	0.0	0.00	0.00
200.00	LB	200.0	200.0	0.0	0.0	0.00	0.00
200.00	RR	200.0	200.0	0.0	0.0	0.00	0.00
400.00		400.0	400.0	0.0	0.0	0.00	0.00

